

THE PSEUDOCOCCIDAE (COCCOIDEA : HOMOPTERA) OF THE SOLOMON ISLANDS

By D. J. WILLIAMS

INTRODUCTION

THE Solomon Islands stretch for nearly 1000 miles between lat. 5° and 12° S. and long. 154° and 165° E. and in the present report the island of Bougainville is considered along with them. The total land area is about 17,000 square miles, and the terrain is mountainous rising to an elevation of 8,000 ft. in Guadalcanal. Notwithstanding their extent and individual size, and the promise of a rich insect fauna in the natural vegetation, the amount of collecting which has been done so far in the islands is not large compared with that on many other smaller island groups in the Pacific, and as far as the Coccoidea are concerned, and the Pseudococcidae in particular, has been extremely small.

HISTORY

In 1929 Cockerell described *Trionymus malaitensis* on the basis of a collection made by H. S. B. Young. One year later Laing added two species *Heterococcus painei* and *Neosimmondsia hirsuta* based on specimens taken by R. H. Paine and H. W. Simmonds respectively and in 1934 Green described a further species *Pseudococcus leveri* collected by R. A. Lever. Thus up till the present time, with the addition of a cosmopolitan species, our knowledge of the family in this area was confined to five species in four genera.

The present report is based mainly on a study of extensive collections made in the islands by E. S. Brown between 1954 and 1956 and on material collected by B. A. O'Connor. Sixteen species are now added to this list, twelve of them are new and their taxonomic treatment has necessitated the recognition of seven new genera.

There is little known so far of the Coccoidea of New Guinea but collections at hand indicate that there is a closer relationship of the fauna of the Solomon Islands to that of the islands of the Bismarck Archipelago than to the fauna of the main island of New Guinea. In fact none of the Solomon Islands' genera of Pseudococcidae has yet been found in New Guinea, apart from the cosmopolitan genera, but further collecting may prove otherwise. However, *Mutabilicoccus simmondsi* (Laing) described from New Britain is now known throughout the Solomon Islands and specimens are also at hand from Tartua in New Ireland. Another species, *Palmicola browni* sp. n. has been collected from most of the Solomon Islands and specimens are at hand from the Admiralty Islands and New Britain.

GEOGRAPHICAL DISTRIBUTION

The collection records of the Pseudococcidae show the species to be distributed as follows :—

DISTRIBUTION LIST OF SOLOMON ISLANDS' PSEUDOCOCCIDAE

	Bougainville	Santa Ysabel	New Georgia	Malaita	Guadalcanal	San Cristobal	Other Islands	Other Localities
<i>Criniticoccus ficus</i> *						×		
<i>tectus</i> *				×				
<i>theobromae</i> *	×	×						
<i>Dysmicoccus brevipes</i>					×			Cosmopolitan
<i>Exilipedronia sutana</i> *					×			
<i>Ferrisiana virgata</i>	×							Cosmopolitan
<i>Laingiococcus painei</i>					×	×	×	
<i>Laminicoccus cocois</i> *							×	
<i>Maculicoccus malaitensis</i>		×		×	×	×	×	
<i>Mollicoccus guadalcanalensis</i> *					×			
<i>Mutabilicoccus artocarpi</i> *				×				
<i>simmondsi</i>			×	×	×	×	×	New Britain, New Ireland
<i>Neosimmondsia hirsuta</i>				×		×		
<i>Palmicola browni</i> *	×				×	×	×	New Britain, Admiralty Is.
<i>Paraputo kukumi</i> *					×			
<i>leverii</i>				×	×	×	×	Fiji
<i>Pedrococcus tinahulanus</i> *					×			
<i>Planococcus citri</i>	×	×	×	×	×	×	×	Cosmopolitan
<i>Pseudococcus adonidum</i>					×			Cosmopolitan
<i>solomonensis</i> *		×		×				
<i>Trionymus chalepus</i> *					×			

* Described as new.

Moreover, it is interesting that *Paraputo leverii* (Green) is now known from Fiji and *Laminicoccus cocois* sp. n. is very close to *L. vitiensis* (Green & Laing), another Fijian species.

From the many species collected by E. S. Brown in the Solomon Islands it is evident that the mealybugs constitute a large part of the endemic fauna and from our scant knowledge it seems safe to state that the same is true for the remainder of the Pacific area. Fijian collections show a large endemic mealybug fauna and Zimmerman (1948) shows that the mealybugs appear to be the only group of Coccoidea to have developed an endemic complex in Hawaii. Serious collecting in the lesser known areas of the Pacific should prove both interesting and valuable and is essential before a comprehensive conclusion on distribution can be drawn.

Of the new genera discussed below, *Mutabilicoccus* is known from the Bismarck Archipelago, the genus *Laminicoccus* from Hawaii and Fiji and *Palmicola* with a wider distribution will probably be found throughout the Pacific; material is at hand from as far afield as Malaya.

The species discussed here are probably only a small proportion of those still to be discovered. It is unfortunate that none have been collected in Choiseul, the least known of the larger islands, or in the Santa Cruz Islands.

Unless otherwise stated all the material has been collected by E. S. Brown.

The types of all new species are deposited in the British Museum (Natural History).

KEY TO GENERA

- | | | |
|---------|---|-------------------------------|
| 1 | Legs with a denticle on the claw, either well developed or small at apex, cerarii absent | 2 |
| - | Legs without a denticle on the claw, cerarii present or absent | 3 |
| 2 (1) | Antennae 9-segmented, quinquelocular pores numerous on dorsum and venter, with a transversely elliptical circulus within the borders of the fourth segment, tubular ducts on dorsum absent, anal ring situated twice its diameter from apex of body | <i>Laingiococcus</i> Morrison |
| - | Antennae 7-segmented, without quinquelocular pores on dorsum and venter, circulus absent, tubular ducts on dorsum larger in diameter than multilocular disc pores, anal ring situated at apex of body | <i>Mollicoccus</i> gen. n. |
| 3 (1) | Anal ring situated one or more times its diameter from apex of body, antennae 6-segmented | 4 |
| - | Anal ring situated at apex or at most a short distance from apex of body, antennae 6-8-segmented. | 5 |
| 4 (3) | Cerarii present, each with numerous setae | <i>Paraputo</i> Laing |
| - | Cerarii absent | <i>Neosimmondsia</i> Laing |
| 5 (3) | With a distinct anal bar present either separate or joined to dorsal sclerotization of anal lobes | 6 |
| - | Without an anal bar or if there is any sclerotization on ventral anal lobes it is in the form of a triangular or quadrate plate | 9 |
| 6 (5) | Each cerarius with 2 conical setae which, except on anal lobes are all of similar size, dorsal setae small and slender | <i>Planococcus</i> Ferris |
| - | Not with this combination of characters | 7 |
| 7 (6) | Cerarii recognizable or unrecognizable, cerarian setae of varying sizes either similar or different in shape to dorsal setae, not borne on sclerotized plates | <i>Mutabilicoccus</i> gen. n. |
| - | Cerarii borne on sclerotized plates | 8 |
| 8 (7) | With 18 pairs of cerarii, cerarian setae slender with some dorsal setae same size as cerarian setae | <i>Exilipedromia</i> gen. n. |
| - | With 17 pairs of cerarii, cerarian setae stout, dorsal setae of different size to cerarian setae | <i>Pedrococcus</i> Mamet |
| 9 (5) | With 14-17 pairs of cerarii | 10 |
| - | With 1 or 2 pairs of cerarii | 14 |
| 10 (9) | With a concentration of minute ducts around the posterior coxae | <i>Palmicola</i> gen. n. |
| - | Without a concentration of minute ducts around the posterior coxae | 11 |
| 11 (10) | With some cerarii with more than 5 setae | 12 |
| - | With no cerarii with more than 5 setae | 13 |
| 12 (11) | Cerarii borne on sclerotized plates, all dorsal setae shorter than anal ring setae | <i>Laminicoccus</i> gen. n. |

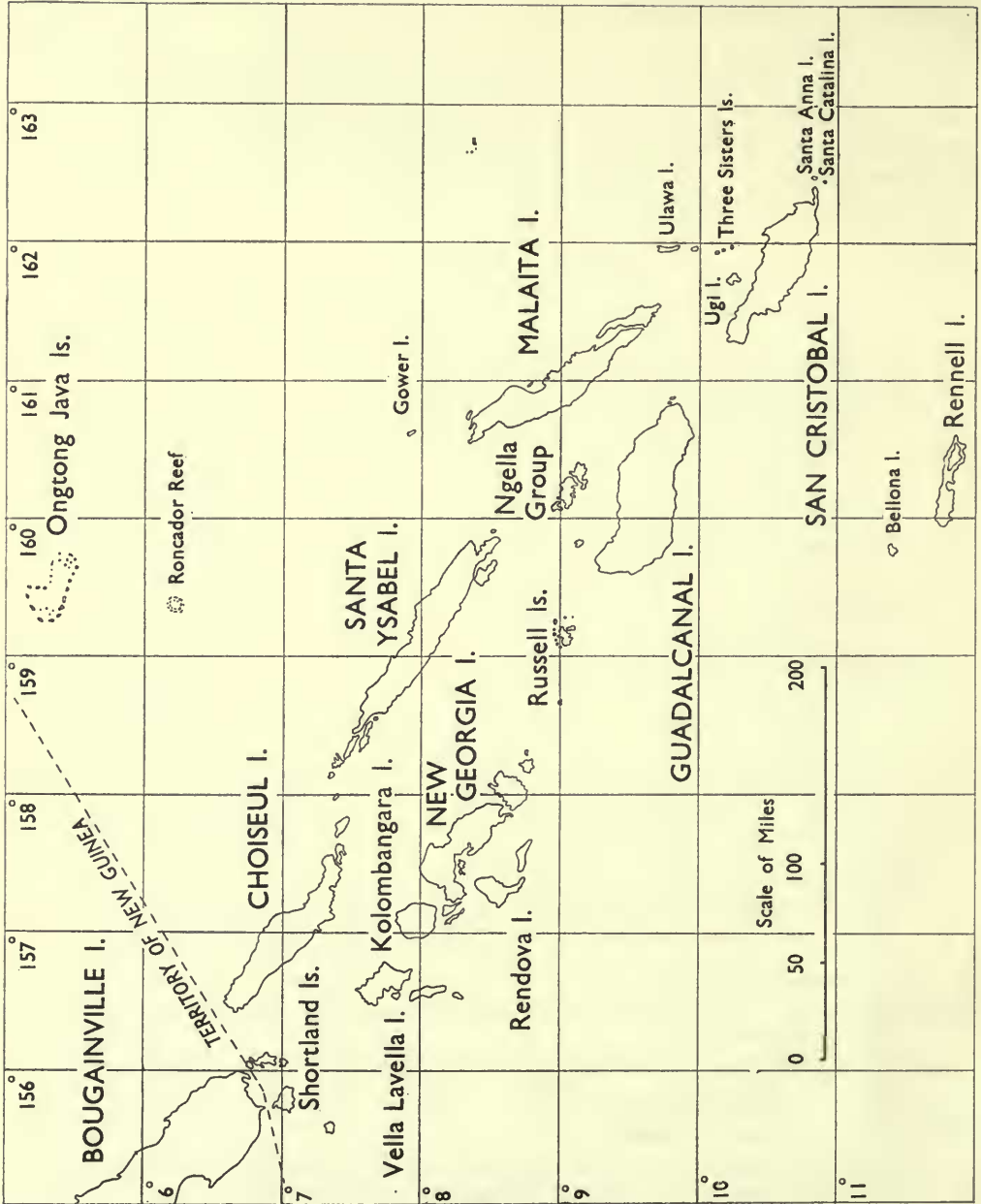


FIG. 1. Map of Solomon Islands.

- Cerarii not borne on sclerotized plates except possibly on anal lobes, most dorsal setae as long as or longer than anal ring setae *Criniticoccus* gen. n.
- 13 (11) With oral rim ducts on dorsum *Pseudococcus* Westwood
- Without oral rim ducts on dorsum *Dysmicoccus* Ferris
- 14 (9) With some dorsal ducts enlarged, each with orifice surrounded by a sclerotized area bearing setae *Ferrisia* Takahashi
- Without such ducts 15
- 15 (14) Ventral surface with numerous minute disc pores, dorsal setae stout, legs stout *Maculicoccus* gen. n.
- Ventral surface without minute disc pores, dorsal setae slender, legs slender *Trionymus* Berg

DESCRIPTION OF SPECIES

Criniticoccus gen. n.

Type of genus *Criniticoccus ficus* sp. n.

RECOGNITION CHARACTERS. Pseudococcidae with 8-segmented antennae; legs normal without a tooth on claw; anterior and posterior ostioles present; cerarii numbering 17 pairs, these with up to 12 conical setae especially at anterior and posterior ends, some of them rarely with less than 5 and always accompanied by auxiliary setae, anal lobe cerarii each with a group of up to 7 conical setae or with but 2 setae; dorsum with long setae, in the known species these as long as or longer than anal ring setae. Tubular ducts of oral collar type always present on venter and usually present on dorsum although in the type species there is but 1 pair, ducts of oral rim type present around margin in one species; multilocular disc pores present around vulva; ventral side of anal lobes with an area of sclerotization as large as or larger than anal ring; circulus well developed lying across fold of fourth and fifth segments; anal ring cellular, apical or at most removed a very short distance from apex, with 6 setae.

NOTES. This genus comes very close to the genus *Dysmicoccus* Ferris but differs in a few characters which seem to warrant the erection of a new genus. There are always some cerarii with 5 or more setae and one species has a few oral rim ducts on the dorsum, characters never found in *Dysmicoccus*. The setae seem to be much longer than normally found in *Dysmicoccus* and in each case they are as long as or longer than the anal ring setae.

The three species included in the genus may be separated by the following key:—

1. Anal lobe cerarii each with 2 conical setae 2
- Anal lobe cerarii each with about 7 conical setae of various sizes, dorsal surface with numerous setae and usually with only a single tubular duct near each tenth cerarius *ficus* sp. n.
2. With a few oral rim ducts around the anterior margin, circulus very large *theobromae* sp. n.
- Without oral rim ducts on dorsal surface but with number of small oral collar ducts around entire margin and a few in midregion *tectus* sp. n.

Criniticoccus ficus sp. n.

(Text-fig. 2)

HABIT. Collected between the fruits of *Ficus* sp., tended by *Iridomyrmex myrmecodiae*, SAN CRISTOBAL, Kira Kira, 21.iv.1955 and 20.vii.1956.

RECOGNITION CHARACTERS. A broadly oval species measuring about 2.7×2.1 mm. Antennae 8-segmented. Legs normal, femur rather stout, hind femur and tibia with translucent pores. Circulus well developed. Ostioles with inner edges of lips sclerotized and lips with a few setae and trilocular pores. Anal ring with 6 setae which are about the same length as its diameter. Cerarii numbering 17 pairs, anal lobe cerarii each with 7-10 conical setae of different sizes, with a few trilocular pores surrounded by a faint sclerotized area. Penultimate cerarii each with about 10-13 conical setae of various sizes on a lightly sclerotized area, the other cerarii diminishing in size anteriorly, each with 5-10 conical setae, the usual number being 7. Dorsal setae numerous, mainly long and slender and about the size of anal ring setae. Trilocular pores rather numerous. Simple circular pores present nearly the same size as a trilocular pore, numerous. A single tubular duct with oral collar usually present near each tenth cerarius.

Ventral surface with a large area of sclerotization on anal lobes, larger in area than anal ring and containing numerous setae and a pair of long stout apical setae. Ventral setae slender, not so long as those on dorsum. Multilocular disc pores arranged around the vulva only, there being about 8-12 anterior to the vulva and about 5 posteriorly. Tubular ducts in transverse rows on segments 6 and 7, and also in groups lateral to the multilocular disc pores on segment 8, there being also one or two ducts to each segment anteriorly and on head, the lateral ducts tending to be slightly larger than those in the transverse rows. Trilocular pores and simple circular pores rather numerous and evenly distributed.

Criniticoccus tectus sp. n.

(Text-fig. 3)

HABIT. Abundant on the fruits of *Theobroma cacao* tended by *Iridomyrmex myrmecodiae* and always covered by a carton, MALAITA, Su'u, 1.vi.1955.

RECOGNITION CHARACTERS. Shape broadly elliptical measuring 3.0×2.5 mm., anal lobes well developed. Antennae 8-segmented. Legs normal, posterior pair with numerous translucent pores on each femur and tibia. Circulus large and well developed. Ostioles present with one or two long setae and a few trilocular pores on each lip. Anal ring with 6 setae only slightly longer than its diameter. Cerarii numbering 17 pairs; anal lobe cerarii with two large conical setae and numerous trilocular pores surrounded by an area of sclerotization; anterior cerarii each with 2-8 conical setae of various sizes and 1 or 2 auxiliary setae surrounded by a few trilocular pores, the smaller cerarii tending to occupy the thorax and anterior

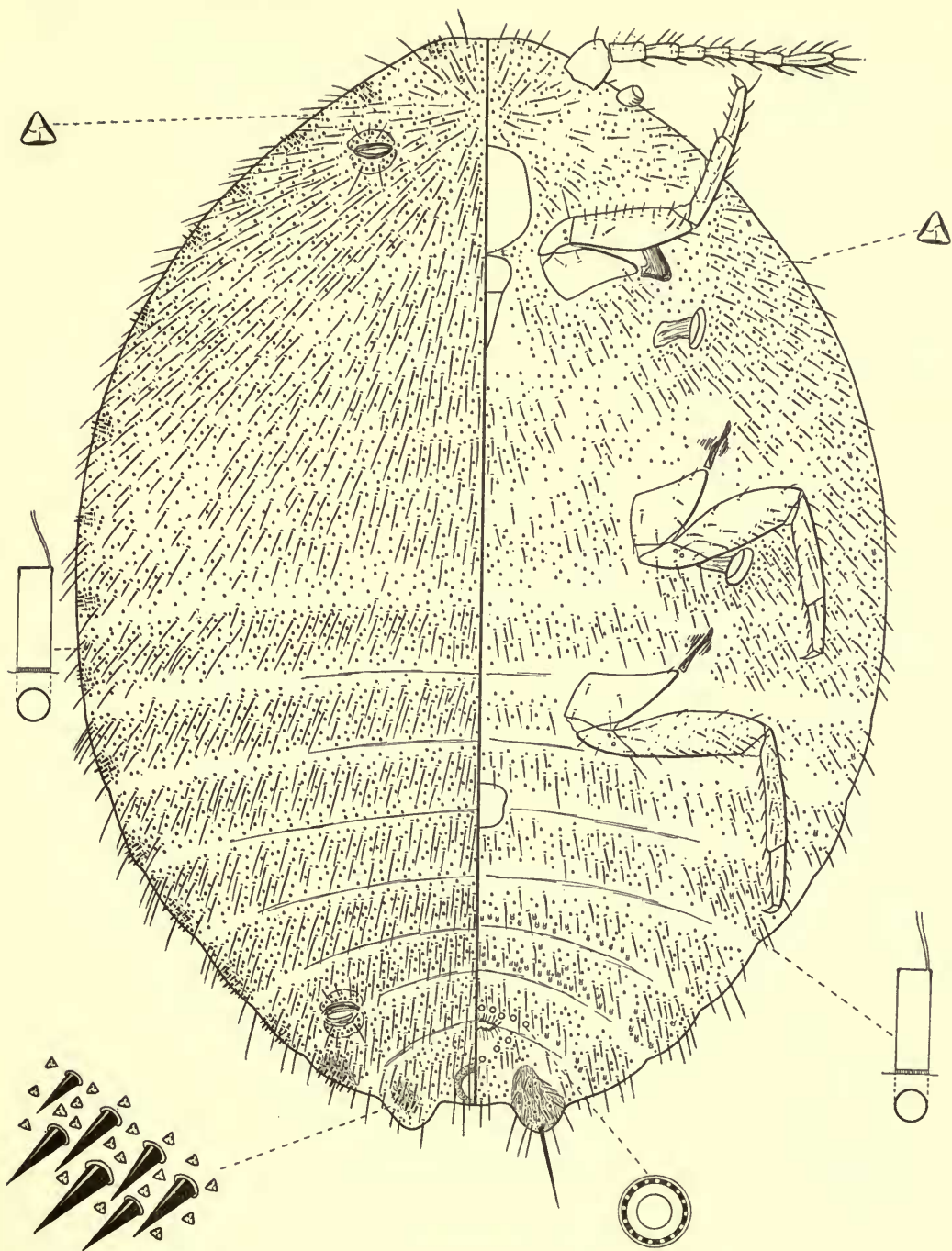


FIG. 2. *Criniticoccus ficus* sp. n.

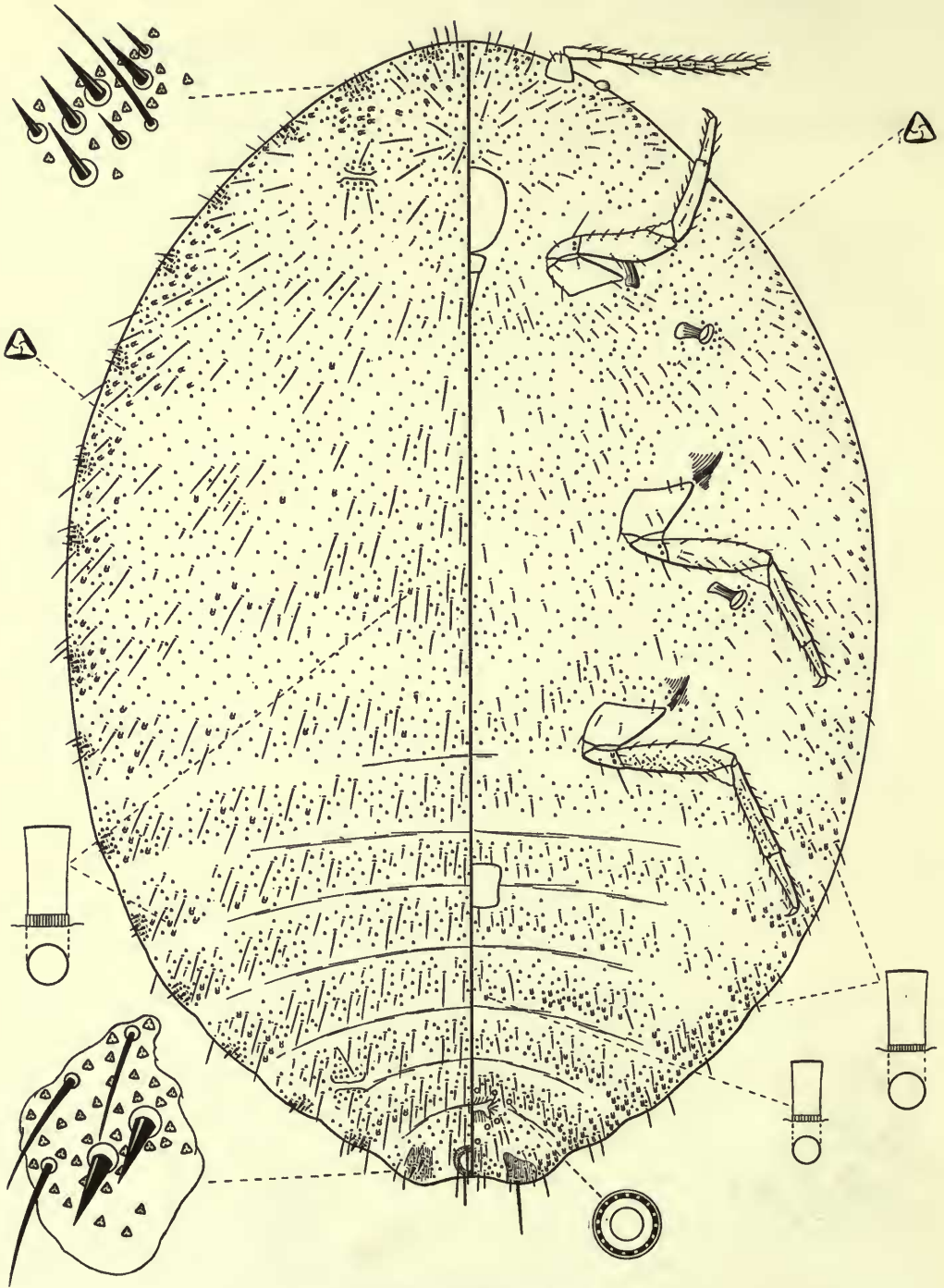


FIG. 3. *Criniticoccus tectus* sp. n.

abdominal segments. Dorsal setae of various sizes but mainly long and slender and longer than anal ring setae, in well defined rows on abdomen but split up and tending to form groups on thorax and head. Dorsal tubular ducts of one size with a well developed collar, in small marginal groups and in single rows on thoracic and anterior abdominal segments. Trilocular pores rather numerous.

Ventral surface with a pair of apical setae nearly twice as long as anal ring setae, on a more or less quadrate sclerotized area bearing 3 or 4 slender setae and a few trilocular pores. Ventral setae not numerous, usually more slender and shorter than dorsal setae. Multilocular disc pores confined to about 6 on the prevulvar segment and a group of 2-6 posterior to the vulva. Tubular ducts of two sizes but smaller than those on dorsum, a small type of duct situated in transverse rows on midregion of segments 5-8 and a larger type present in groups around the margins, which become less numerous anteriorly. Trilocular pores numerous and evenly distributed. Vulva of an indefinite shape with noticeable internal folds.

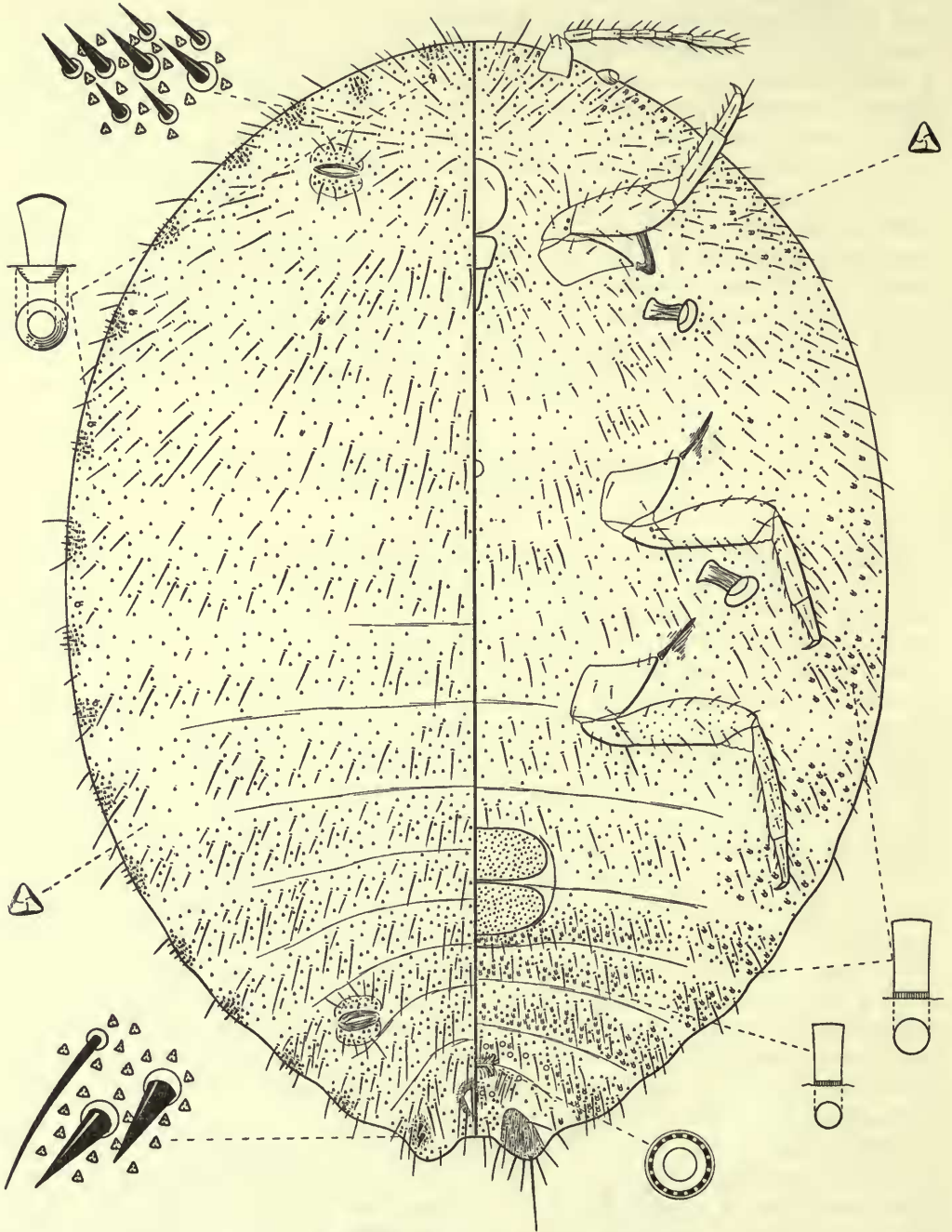
Criniticoccus theobromae sp. n.

(Text-fig. 4)

HABIT. On the fruits of *Theobroma cacao* tended by *Technomyrmex detorquens*. The ants build carton shelters over them and the colonies are situated down the length of the fruit in the grooves. The species has been collected in the following areas:— SANTA YSABEL, Holokama, 21.ii.1956, E. S. Brown (Type material). BOUGAINVILLE, Numa Numa 1.iv.1956, J. J. H. Szent-Ivany.

RECOGNITION CHARACTERS. Body broadly ovate measuring about 2.7×2.0 mm. Antennae 8-segmented. Legs normal, femur rather stout, translucent pores on femur and tibia. Circulus quite large, very noticeable in lateral aspect by hanging underneath the body and distorting the neighbouring segments when flattened on the slide. Ostioles present, well developed. Anal ring removed a short distance from apex of body, with 6 setae these only slightly longer than diameter of ring. Cerarii numbering 17 pairs, anal lobe cerarii with 2 stout conical setae and a cluster of trilocular pores surrounded by a more or less oval sclerotized area. Anterior cerarii each with 5-11 conical setae of various sizes but usually with 2 which are larger than the others. Dorsal setae mainly long and slender in most cases being as long as or longer than anal ring setae. Tubular ducts with a narrow oral rim, arranged singly behind the frontal cerarii and usually on the inner side of the thoracic and anterior abdominal cerarii there being usually about 5 pairs altogether. An occasional duct with oral collar sometimes present on the mid-thoracic region. Trilocular pores distributed evenly over surface.

Ventral surface with a well defined sclerotized area extending inwards from the anal lobes, containing about 8 setae including a long pair of apical setae, this area about same size or slightly larger than area of anal ring. Ventral setae mainly slender and for the most part are shorter than those of dorsum. Multilocular disc pores confined to a row of 5-10 on the eighth segment and another 5-10 posterior to the vulva. Tubular ducts of two sizes both with oral collar; a smaller type

FIG. 4. *Criniticoccus theobromae* sp. n.

situated in transverse rows in the median areas of segments 6-8 although there are sometimes a few such ducts on the fifth segment; a larger type is arranged in groups around the margins from the anal lobes to the head, becoming less numerous anteriorly. Trilocular pores not numerous.

Dysmicoccus Ferris

Dysmicoccus Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 53.

This genus differs from *Pseudococcus* Westwood in lacking dorsal oral rim ducts. A number of species of *Pseudococcus* from the Pacific area have a reduced number of these ducts and in occasional specimens they are absent entirely. The genera are herein considered to be distinct until a revision of the whole group may show otherwise. In its present form *Dysmicoccus* comes close to *Criniticoccus* to which it differs in having cerarii with less than 5 setae and with the dorsal setae shorter than the anal ring setae.

Dysmicoccus brevipes (Cockerell)

Dactylopius brevipes Cockerell, 1893, *Entomologist*, 26 : 267.

Pseudococcus cocotis (Maskell), Pagden & Lever, 1935, *Brit. Solomon Is. agric. Gaz.*, 3 : 18 (misidentification).

Dysmicoccus brevipes (Cockerell), Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 59.

GUADALCANAL : Kukum, *Annona muricata* 13.viii.1954, *Cyperus* sp. 22.ix.1955 ; Rua Vatu, *Pandanus* sp. 5.iv.1955, *Cocos nucifera* roots associated with *Pheidole megacephala* ; Kokumbona, pineapple 6.xi.1954.

Specimens at hand collected and recorded by Pagden & Lever (1935) as *Pseudococcus cocotis* (Maskell) from coconut have been misidentified and are undoubtedly specimens of *Dysmicoccus brevipes* (Cockerell).

Exilipedronia gen. n.

Type of genus *Exilipedronia sutana* sp. n.

RECOGNITION CHARACTERS. Pseudococcidae with 18 pairs of cerarii each with up to 10 conical setae and borne on a sclerotized area or plate; dorsal setae of various sizes ranging from conical and similar to cerarian setae, to small and slender, often with one or two trilocular pores at the bases but not surrounded by sclerotized areas; anterior and posterior pairs of ostioles well developed; circulus present; antennae 6-segmented; multilocular disc pores on venter only; tubular ducts of oral collar type on venter; ventral side of anal lobes with a well developed anal bar continuous with dorsal sclerotization; anal ring cellular with 6 setae; legs slender, claw without a denticle.

NOTES. This genus differs from *Pedronia* Green in possessing 18 pairs of cerarii all on sclerotized plates with the cerarian setae much more slender and numbering up to 10. In *Pedronia* the cerarian setae are in pairs and quite stout and not borne on sclerotized areas. Species at present placed in the genus *Pedronia* do not appear

to be congeneric with the type. The nearest approach to *Exilipedronia* seems to be *Pedrococcus* Mamet but all the species in this genus have dorsal setae or cerarii on sclerotized areas.

Exilipedronia sutana sp. n.

(Text-fig. 5)

HABIT. A mealybug covered with white wax living in lines down the midribs of an unknown tree, GUADALCANAL: Sutakiki River, 26.vi.1956 and Suta 29.vi.1956.

RECOGNITION CHARACTERS. Body elongate-oval, length of mounted specimens about 2.5 mm., anal lobes well developed. Cerarii numbering 18 pairs each borne on a sclerotized plate and possessing 4-10 conical setae of various sizes, the largest cerarii on anal lobes and head and becoming progressively smaller towards thorax. Antennae 6-segmented. Legs short and slender, posterior coxae with a few translucent pores. Circulus well developed. Ostioles with 2-4 small conical setae on each lip and with inner edges of lips sclerotized. Anal ring with 6 setae which are about twice as long as diameter of ring. Dorsal setae mainly conical and similar to those of cerarii, differing in size, lying in transverse rows and occasionally between the cerarii, often with one to three trilocular pores at base, never borne on sclerotized areas; other dorsal setae small and slender, not numerous. Trilocular pores sparse.

Ventral surface with an anal bar which is continuous with the sclerotized area on dorsal surface of anal lobes. Apical setae long and stout, longer than anal ring setae. Multilocular disc pores few there being usually a pair on the sixth abdominal segment, 5-6 on the seventh segment, 4-10 on the eighth segment and 4-8 posterior to the vulva, altogether there are scarcely more than 25. Tubular ducts small, of oral collar type, situated in submedian area of segments 6-8 in numbers of 2-3 on each segment. They are more numerous around the submargin of head and thorax also anterior to the clypeus and between the anterior coxae and labium. Trilocular pores sparse.

Ferrisiana Takahashi

Ferrisiana Takahashi, 1929, *Trans. nat. Hist. Soc. Formosa*, 19 : 429.

Ferrisiana Takahashi, Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 88.

The cosmopolitan species belonging to this genus has been found on only two occasions in BOUGAINVILLE. Although it may be present in the Solomon Islands it does not seem to have gained a foothold.

Ferrisiana virgata (Cockerell)

Dactylopius virgata Cockerell, 1893, *Entomologist*, 26 : 178.

Ferrisiana virgata (Cockerell), Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 93.

Collected at BOUGAINVILLE, Kieta, on *Erythrina* sp. 1935 and on *Leucaena glauca* 17.viii.1938 by J. L. Froggatt.

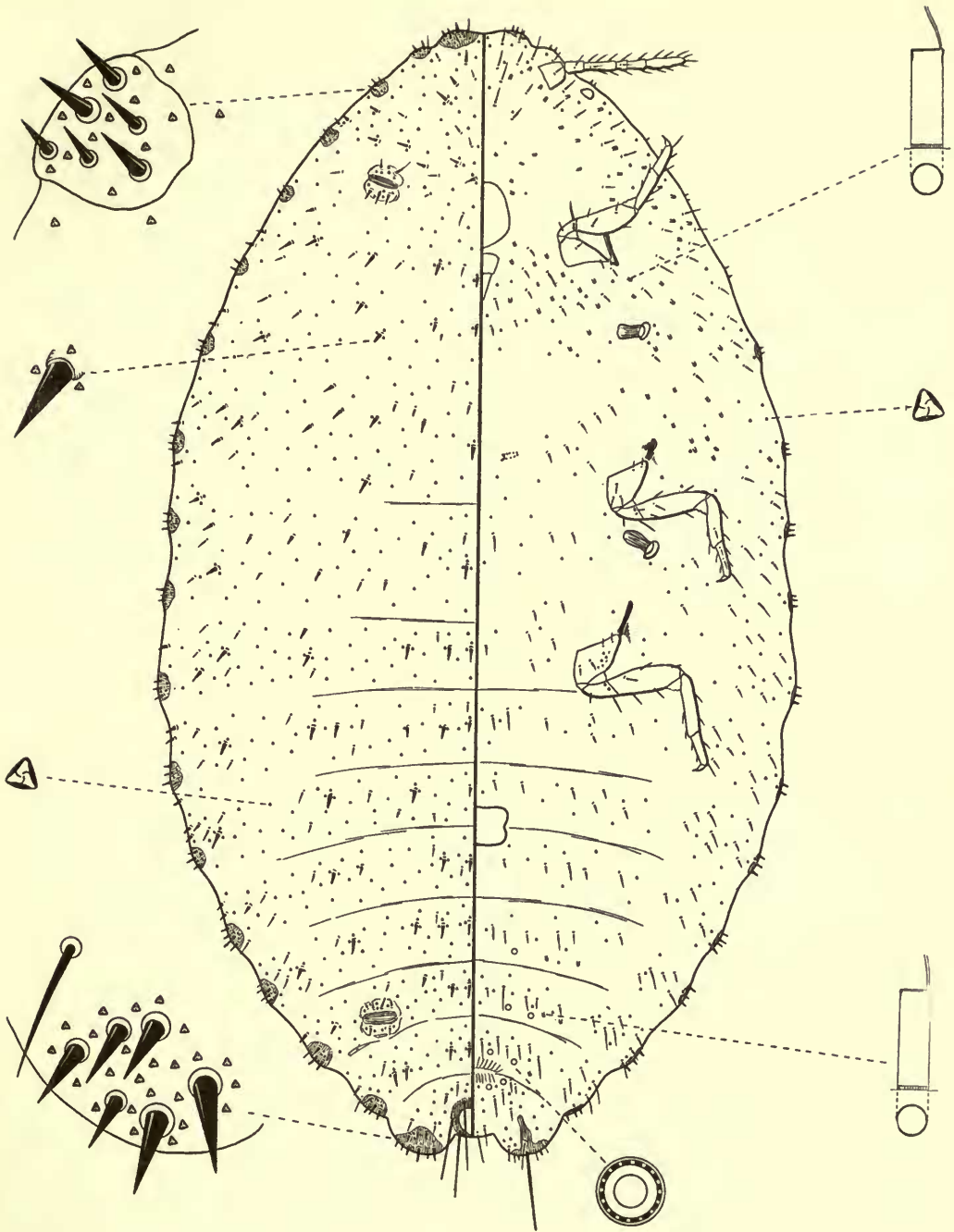


FIG. 5. *Exilipedronia sutana* sp. n.

Laingiococcus Morrison

Laingiococcus Morrison, 1945, *J. Wash. Acad. Sci.*, **35** : 54.

RECOGNITION CHARACTERS. Pseudococcidae with anal lobes removed a short distance on the dorsal surface so that the angles formed by the margins of the penultimate segment appear as anal lobes ; anal ring lying about twice its diameter from apex of body, with a double band of pores and 6 setae ; antennae 9-segmented ; legs long and slender, claw with a distinct denticle ; cerarii absent ; setae on dorsum and ventral margin, numerous, stout and stiff, of various sizes, other setae slender ; quinquelocular disc pores on dorsum and venter ; multilocular disc pores on ventral side of abdomen only ; tubular ducts of oral collar type very few on ventral surface ; circulus transversely elliptical situated within boundaries of the fourth segment ; labium 2-segmented.

NOTES. Morrison (1945) erected this genus for *Heterococcus painei* Laing and stated that it differed widely from the other genera of the *Heterococcus* group. Although Laing has described the labium as unsegmented and the anal ring with only one pore band, both are normal. The dorsal and ventral surfaces have a number of trilocular pores but this character would not normally exclude the genus from the *Heterococcus* series because these pores are often present in the genus *Heterococcus*. However, the absence of cerarii and the shape of the setae do not suggest a close relationship to this group.

Laingiococcus painei (Laing)

(Text-fig. 6)

Heterococcus painei Laing, 1930, *Bull. ent. Res.*, **21**: 20, 21.

Laingiococcus painei (Laing), Morrison, 1945, *J. Wash. Acad. Sci.*, **35** : 54.

HABIT. Described originally from the Solomon Islands (no locality given) on coconut. Notes given by E. S. Brown show that the insect is without mealy wax and the body colour ranges from yellow to brown or even pinkish and often found in dense groups near ants' nests where they are tended by the ants or found within the nests. GUADALCANAL : Tenaru, *Ficus* sp. 10.viii.1954, unknown vine, 12.viii.1954, coconut, 12.v.1955 ; Kukum, coconut 20.vii.1954 ; Rua Vatu, *Ficus* sp. 23.vi.1954 ; Rua Sura Is., on a shrub 17.viii.1955 ; Mamara, *Ficus septica* 30.vii.1955. RUSSELL IS.: Pepesala, *Ficus* sp., 7.vii.1954. SAN CRISTOBAL : Kira Kira, *Ficus* sp., 20.vii.1956. KOLOMBANGARA : Karikana, *Maesa* sp. In nearly all cases the mealybugs are tended by *Oecophylla smaragdina*.

RECOGNITION CHARACTERS. Adult female ovate measuring approximately 2.1 × 1.8 mm. Anal lobes on dorsal surface, removed a short distance from posterior margin so that the angles formed by the lateral margins of the penultimate segment appear as anal lobes. Antennae 9-segmented. Legs normal, claw with a well developed denticle. Circulus transversely elongate situated within the boundaries of fourth segment. Ostioles absent. Anal ring with a double row of pores, situated about twice its diameter from apex of body, with 6 setae, these slightly longer than diameter of ring. Cerarii absent. Dorsal surface with numerous setae of various sizes ranging

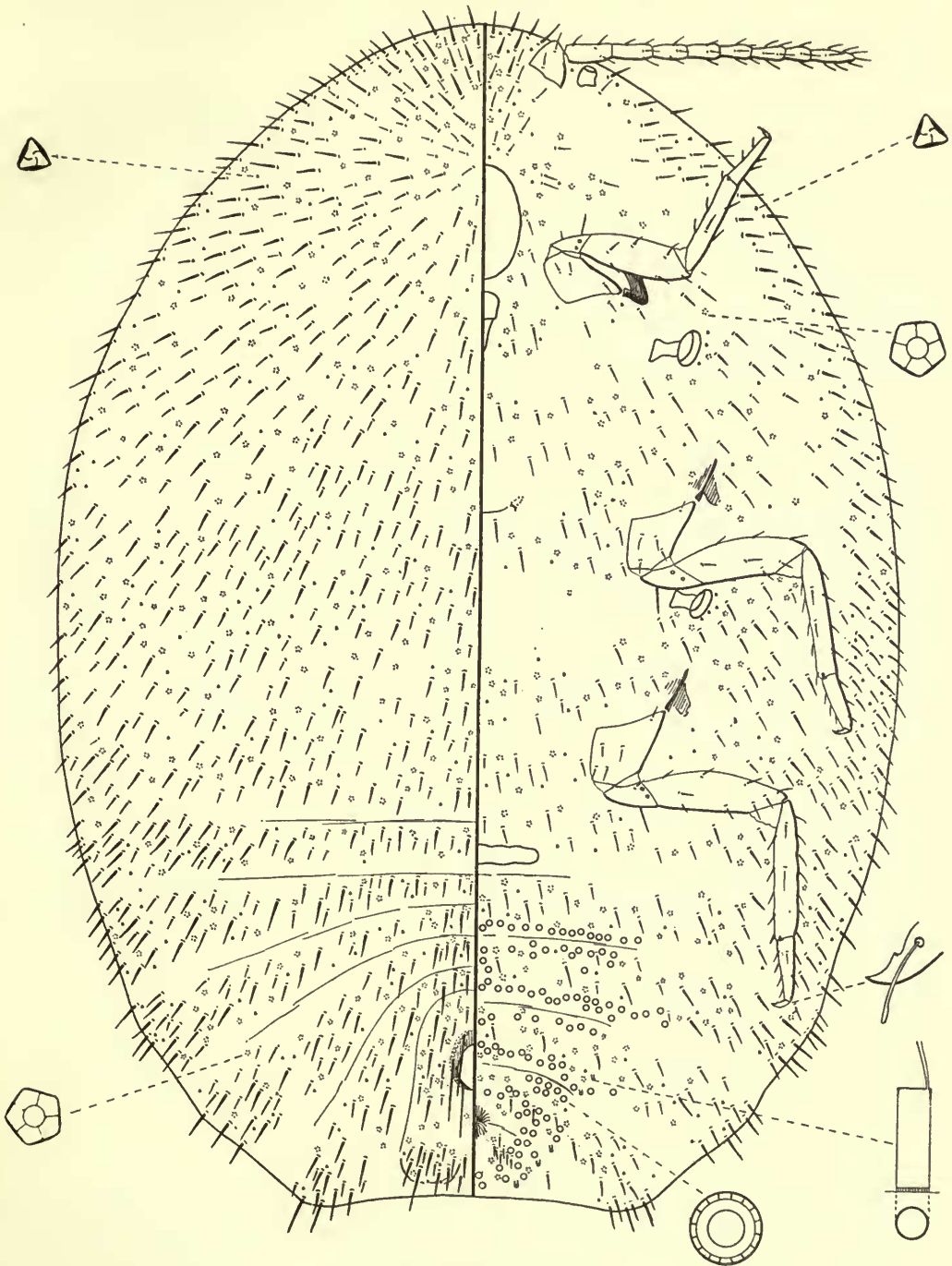


FIG. 6. *Laingiococcus painei* (Laing)

from short and slender to long and stout, the latter tending to be more numerous around margins. Quinquelocular disc pores scattered over entire dorsal surface. Trilocular pores sparse but evenly distributed.

Ventral surface with slender setae in midregion but replaced laterally by stouter setae similar to those on dorsal surface. Multilocular disc pores on all segments posterior to circulus, confined to midregion in more or less single transverse rows on the posterior edges and on anterior edges of sixth to eighth segments. Tubular ducts few in number there being one or two in each of submedian areas of segments 7-9. Quinquelocular disc pores uniformly distributed except on the intersegmental lines. Trilocular pores sparse but present on all segments and noticeable in small groups of 3-4 around spiracular openings.

NOTES. The name mentioned by Lever (1933) as *Phenacoccus horridus* Green is a *nomen nudum* and refers to this species.

Laminicoccus gen. n.

Type of genus *Tylococcus giffardi* Ehrhorn.

RECOGNITION CHARACTERS. Pseudococcidae with body broadly oval; cerarii numbering 17 pairs and borne on distinct sclerotized plates, cerarii each with 6-10 or more conical setae; body setae all slender; legs normal, claw without a denticle; anterior and posterior ostioles present; circulus present or absent; anal ring with 2 rows of pores and 6 setae; tubular ducts on dorsum and venter, more numerous around margins, either with small oral rim or of oral collar type; multilocular disc pores mainly on ventral side of abdomen.

NOTES. This is a distinctive genus by the presence of cerarii with numerous conical setae surrounded by definite sclerotized areas. It may be confused with some genera of the *Phenacoccus* series, for instance *Rastrococcus* Ferris has cerarii borne on sclerotized plates but in this genus there is also a denticle on the claw and the antennae are 9-segmented. Some species of the genus *Puto* Signoret may be confused with species of the genus *Laminicoccus*. The genus *Puto* normally contains species with cerarii on sclerotized plates, with 9-segmented antennae and with a denticle on the claw. At least two species are without the denticle and one of these, *Puto alpinus* Balachowsky has 8-segmented antennae. These species and all other similar species of genera in the *Phenacoccus* series have either dorsal cerarii or minute lanceolate setae on the dorsal surface and the genus *Laminicoccus* has species with slender setae.

Apart from the type the following new species and *Pseudococcus vitiensis* Green & Laing described from Fiji are included in the genus and may be separated by the following key:—

- | | | |
|----|--|----------------------------------|
| 1. | Circulus present, tubular ducts of oral collar type only | 2 |
| - | Circulus absent, tubular ducts small each with a narrow oral rim | <i>giffardi</i> (Ehrhorn) |
| 2. | Multilocular disc pores on posterior edges of segments only totalling about 70-90,
tubular ducts in midregion of seventh and eighth segments | <i>cocois</i> sp. n. |
| - | Multilocular disc pores on anterior and posterior edges of seventh and eighth segments,
total number in region of 140-170, tubular ducts in midregion of abdomen on
fifth to eighth segments | <i>vitiensis</i> (Green & Laing) |

Laminicoccus cocois sp. n.

(Text-fig. 7)

HABIT. Collected from the terminal bud of coconut, ONTONG JAVA, Pelau, 3.ii.1955.

RECOGNITION CHARACTERS. Shape of adult female broadly oval, approximately 2.5 mm. in length. Antennae 8-segmented. Legs normal, each posterior leg with translucent pores on the coxa, femur and tibia. Circulus of moderate size, round. Ostioles present, each with two or three setae and a few trilocular pores on lips. Anal ring with 6 setae, these about twice as long as diameter of ring. Cerarii numbering 17 pairs, each borne on a distinct sclerotized plate; anal lobe cerarius with 7-8 conical setae of various sizes and a cluster of trilocular pores on a sclerotized plate which is about same size as anal ring; other cerarii each with 6-8 conical setae except the two anteriormost which often have up to 11 setae; the sclerotized plates becoming smaller towards thorax. Dorsal setae not numerous, all slender. Tubular ducts of oral collar type situated around the margins in small groups. Trilocular pores evenly distributed.

Ventral surface of each anal lobe with a triangular sclerotized area and a long, stout, apical seta. Ventral setae of various sizes, all slender. Multilocular disc pores confined to posterior edges only of fifth to eighth segments and also to a group posterior to vulva, there being 2-4 on fifth segment, in single transverse rows on sixth and seventh segments and in a double row on eighth segment, altogether there are about 70-90 pores. Tubular ducts similar to those on dorsum in small groups around the margin from the anal lobes to a point lateral to the first coxae; other tubular ducts of smaller diameter sparse, in the midregions of seventh and eighth segments and also occasionally in the submarginal area. Trilocular pores not numerous.

NOTES. This species comes very close to *L. vitiensis* (Green & Laing) described from Fiji. It differs from the latter in having a row of multilocular disc pores at the posterior edge only of segments 7 and 8, whilst in *L. vitiensis* these segments have rows at the anterior edges also. A few other differences with *L. vitiensis* and with the type of the genus are noted in the key.

Maculicoccus gen. n.

Type of genus *Trionymus malaitensis* Cockerell.

RECOGNITION CHARACTERS. Broadly oval species of Pseudococcidae with 8-segmented antennae; with anterior and posterior pairs of ostioles. Legs rather stout without a denticle on claw; circulus present, well developed; cerarii confined to the two posterior pairs or to anal lobes only, with up to 7 conical setae; dorsal setae mainly long and stout. Anal ring lying a short distance from apex of body, cellular, with 6 setae; multilocular disc pores about the vulva only; tubular ducts of oral collar type on ventral side of abdomen; median areas of venter with numerous irregularly shaped disc pores each with granular surface and smaller than a multilocular disc pore; ventral side of anal lobes with a well defined sclerotized area.

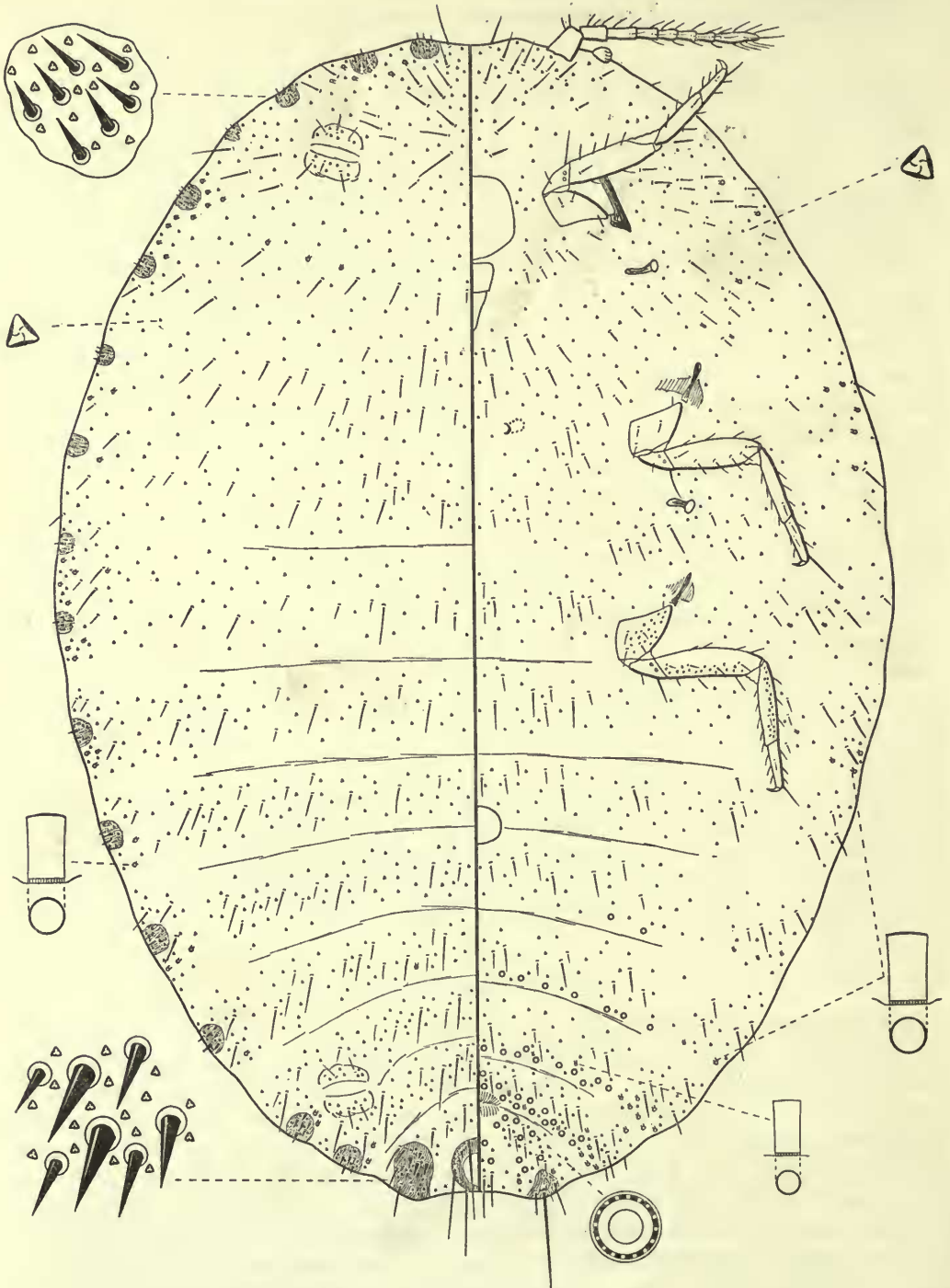


FIG. 7. *Laminicoccus cocois* sp. n.

NOTES. In his original description of the type species Cockerell had some doubt as to whether it was correctly placed in the genus *Trionymus*. It seems to have little in common with this genus as the circulus is quite large and the dorsal setae are mainly long and stout or bristle-like. Furthermore the ventral surface is beset with numerous disc pores, none of these characters being common to *Trionymus* and therefore a new genus has been erected for the single species. At this stage when so few genera are known in the Pseudococcidae it is difficult to give any relationship with this genus to any other.

Maculicoccus malaitensis (Cockerell)

(Text-fig. 8)

Trionymus malaitensis Cockerell, 1929, *Entomologist*, 62 : 90, 91.

HABIT. Cockerell described this species from Malaita on coconut. It seems to infest a number of plants. The insect is brown to brownish yellow, naked except for a few white flecks at the posterior end, occurring in compact masses and in each case tended by *Oecophylla smaragdina*.

GUADALCANAL: Trench's beach, Ilu and Marau on unidentified trees. SAN CRISTOBAL: Waimamura, *Inocarpus edulis*, 20.iv.1955; Malau and Three Sisters on unknown shrub. SANTA YSABEL: Holokama, *Theobroma cacao*, 17.ii.1956. SHORTLAND IS.: Loping Estate, *Cocos nucifera*, H. T. Pagden, 25.iv.1934.

RECOGNITION CHARACTERS. Body broadly ovate, anal lobes developed; attaining a size of 2.0 × 1.5 mm. Antennae 8-segmented. Legs well developed, stout. Circulus present, rather large and lying between fourth and fifth segments. Lips of ostioles with numerous trilocular pores but without setae, inner edges of lips sclerotized and peculiarly short. Anal ring lying at a distance of about half its diameter from the posterior margin, with 6 setae which are a little longer than diameter of ring. Cerarii confined to either the two posterior segments or in one case to the anal lobes only, anal lobe cerarii each consisting of 6-7 conical setae of various sizes surrounded by numerous trilocular pores. Penultimate cerarii each with 3-5 conical setae and a few trilocular pores. Dorsal surface with long robust setae especially near margins and midregion, interspersed with shorter and more slender setae. Trilocular pores absent in some of submedian areas of posterior abdominal segments but elsewhere evenly distributed.

Ventral surface of anal lobes with a long stout pair of apical setae and a more or less quadrate sclerotized area. Ventral setae of various sizes, slender in midregion but becoming more robust and longer towards lateral margins where they are similar to those on dorsum. Multilocular disc pores few there being usually 2-3 on eighth segment near vulva and 2-3 posterior to vulva, the total number being rarely more than 4 or 5. Tubular ducts on segments posterior to circulus, on the fifth segment there is a small median group and posteriorly they become more numerous to the eighth segment lying in transverse rows at the posterior edges, there being also a small group on each anal lobe. Median areas of thorax and anterior abdominal segments thickly beset with irregularly shaped disc pores, intermediate in size

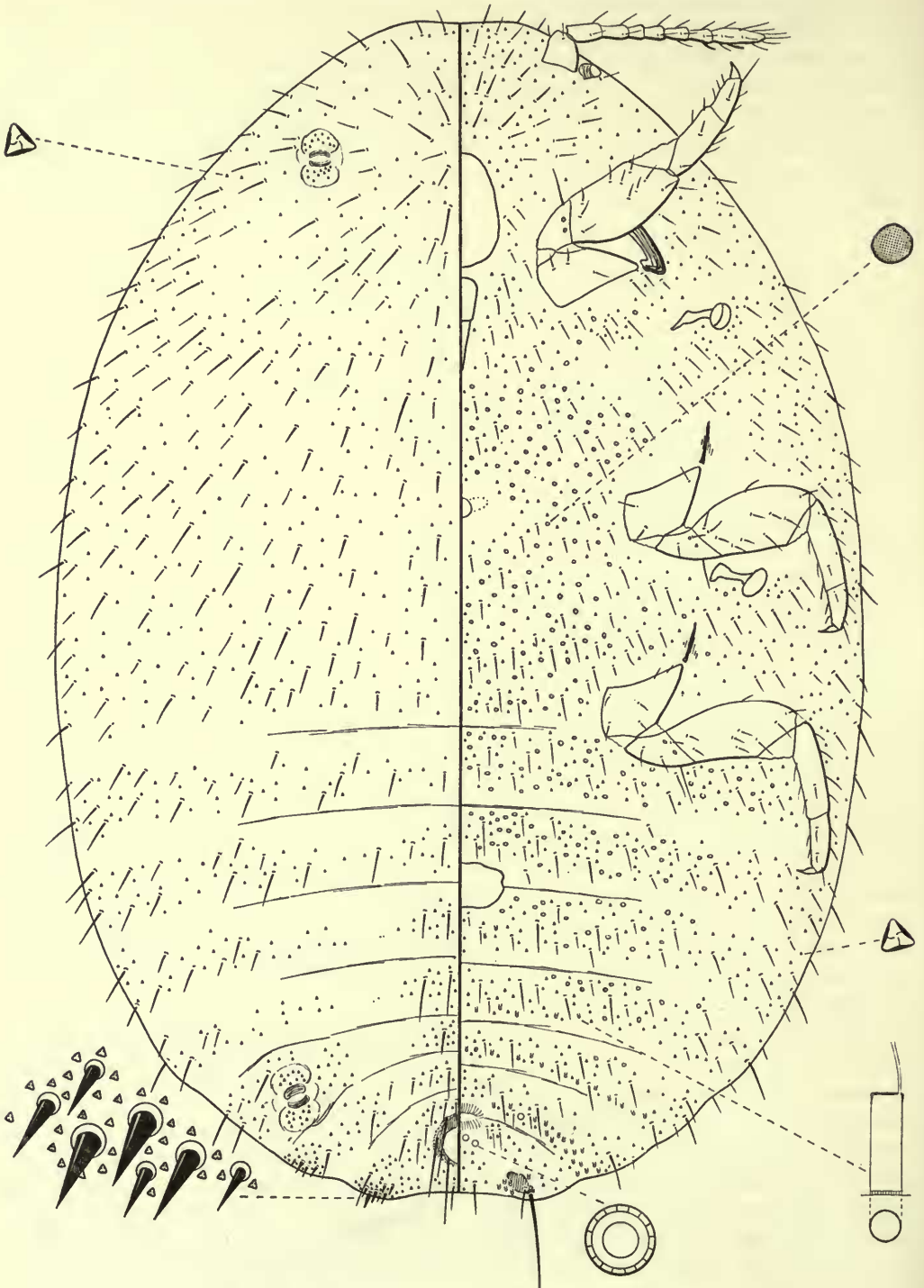


FIG. 8. *Maculicoccus malaitensis* (Cockerell)

between trilocular and multilocular disc pores, the usual shape being oval with a granular surface. Trilocular pores with a uniform distribution.

NOTES. The specimens collected at Shortland Islands differ from the others in possessing a single pair of cerarii only but as all the other characters are the same this character alone does not seem to be of specific difference.

Mollicoccus gen. n.

Type of genus *Mollicoccus guadalcanalanus* sp. n.

RECOGNITION CHARACTERS. Pseudococcidae with poorly developed anal lobes; cerarii absent; antennae 7-segmented; legs slender, claw with a small denticle near apex; ostioles present as a poorly developed posterior pair only; circulus absent; dorsal setae sparse, mainly long and moderately stout; multilocular disc pores present on venter only, dorsal tubular ducts of oral collar type quite large, diameter greater than that of multilocular disc pores; ventral tubular ducts of smaller diameter than multilocular disc pores; anal ring cellular with 6 setae; ventral surface of anal lobes with a small area of sclerotization.

NOTES. The absence of cerarii and the presence of large ducts on the dorsum, each with a diameter greater than a multilocular disc pore serve to distinguish this genus from others in the *Phenacoccus* series.

Mollicoccus guadalcanalanus sp. n.

(Text-fig. 9)

HABIT. External appearance not known. Collected from carton shelters made by *Iridomyrmex myrmecodiae* on the leaves close to the petiole attachment of a small unidentified tree. GUADALCANAL: Tinahula River, 22.iii.1955.

RECOGNITION CHARACTERS. A small, fragile, oval species measuring approximately 1.4×1.0 mm., anal lobes poorly developed. Antennae 7-segmented. Legs normal, rather small, claw with a small denticle near apex. Circulus absent. Ostioles represented by a small, posterior pair with about 3 trilocular pores on each lip but without setae. Anal ring with 6 setae, these nearly twice as long as diameter of ring. Cerarii absent. Dorsal surface with few setae, these mainly long and stout. Tubular ducts of a distinctive type present on all segments, each duct of oral collar type with a diameter greater than that of a multilocular disc pore, distributed in lateral groups of 2-4 on the last 3 segments, in more or less single transverse rows on the anterior abdominal segments and becoming more numerous and scattered on the thorax and head. An occasional small tubular duct present on margins. Trilocular pores sparse.

Ventral surface with a small area of sclerotization on each anal lobe and a pair of long apical setae. Ventral setae slender, shorter than those on dorsum, not numerous. Multilocular disc pores confined mainly to abdomen where there are about 6-8 on the anterior edge of each segment, a few also present between second and third pairs of coxae. Tubular ducts of three sizes all of oral collar type; a large type

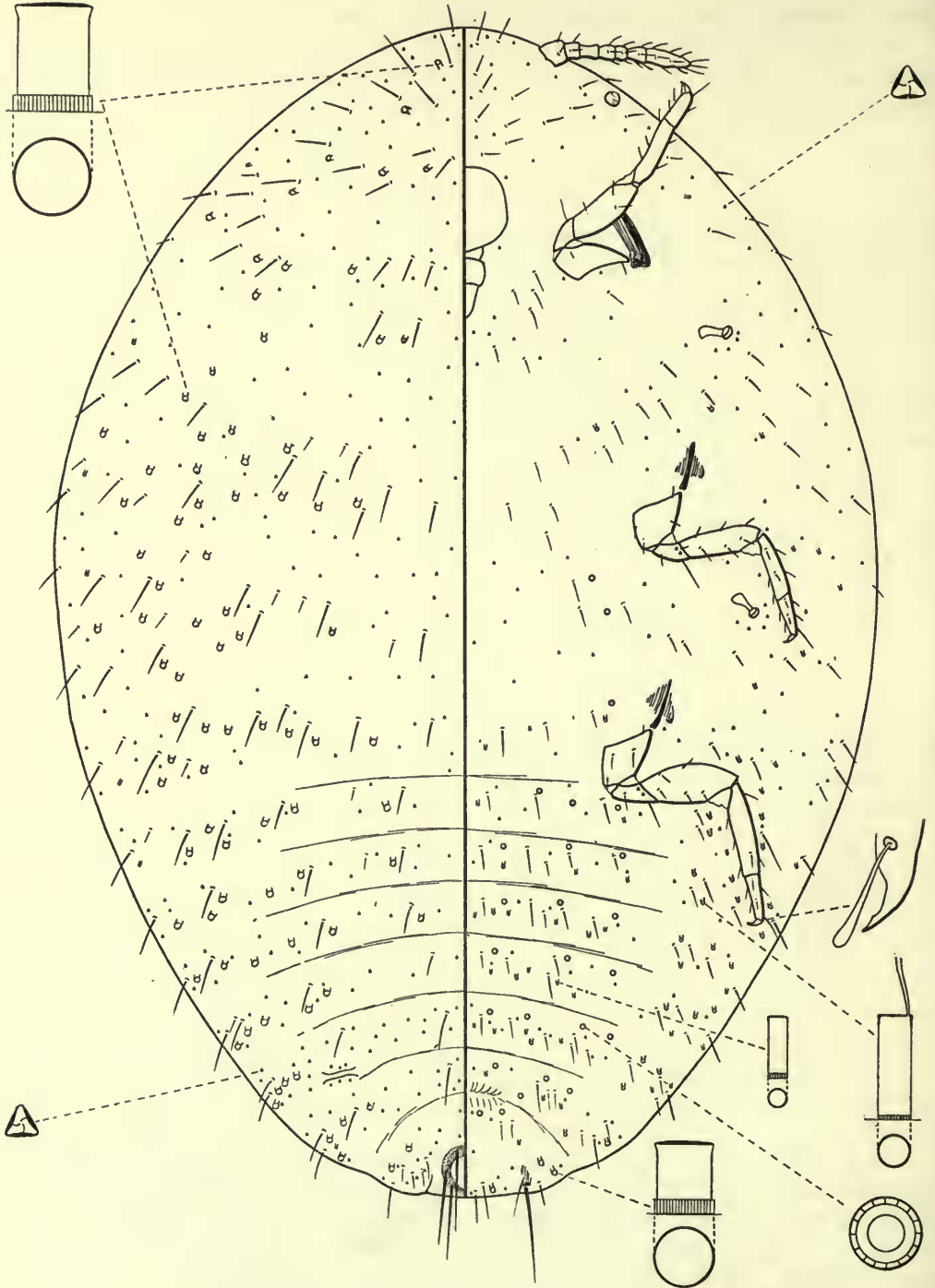


FIG. 9. *Mollicoccus guadalcanalanus* sp. n.

approaching in size the large ducts on dorsum is situated on the anal lobes and sometimes on the eighth segment, there being scarcely more than 8-10 in all. A small type of duct present in midregion of abdominal segments often interspersed with a slightly larger type, the latter more common laterally, other ducts sparsely distributed on thoracic margins and between coxae. Trilocular pores sparse.

Mutabilicoccus gen. n.

Type of genus *Farinococcus simmondsi* Laing.

RECOGNITION CHARACTERS. Broadly oval species of Pseudococcidae with antennae 6-8-segmented; legs normal, without a denticle on the claw; anal ring situated at apex of body, cellular, with 6 setae; anal bar well developed on ventral side of anal lobes; anterior and posterior ostioles present; cerarii variable, either with 18 pairs, each with 2 long stout setae similar to dorsal setae, with numerous, long, stout setae, the groups recognizable by the concentrations of trilocular pores, or forming a more or less continuous band with setae of similar width at the base but varying from short and conical to longer than anal ring setae and stouter than body setae; multilocular disc pores on venter of abdomen only; tubular ducts on venter only. Circulus present or absent, when present rather large and well developed.

NOTES. This genus has been erected because the type species bears little resemblance to *Farinococcus* Morrison redefined by Ferris (1955) or to similar genera. It differs in having the anal ring at the apex of the body and in having peculiar cerarii. In *Farinococcus* the cerarian setae are small and conical and the body setae are minute whilst in *Mutabilicoccus* the cerarian setae are much larger and either the same size as the dorsal setae or if larger they show considerable variation in length. It is not certain whether the new species described below is congeneric with the type but it has been placed here for the time being pending the discovery of similar species. The two species may be separated as follows:—

- Cerarii forming a more or less continuous band, the setae although of similar width at the base varying in length from small and conical to longer than anal ring setae, always stouter than dorsal setae *artocarpi* sp. n.
 Cerarii either recognizable as 18 pairs with paired setae of same size as dorsal setae or forming a continuous band varying in size and merging with the dorsal setae, in which case their presence can be detected by the concentrations of trilocular pores (see accompanying diagrams) *simmondsi* (Laing)

Mutabilicoccus artocarpi sp. n.

(Text-fig. 10)

HABIT. Taken from the aerial roots of *Artocarpus incisus* tended by *Iridomyrmex myrmecodiae*. MALAITA: Hauhui, 8.ix.1954.

RECOGNITION CHARACTERS. Shape broadly oval, largest available specimens measuring approximately 3.0 × 2.0 mm. Antennae 7-8-segmented. Legs normal, rather small for size of body, posterior coxae with a few translucent pores. Circulus

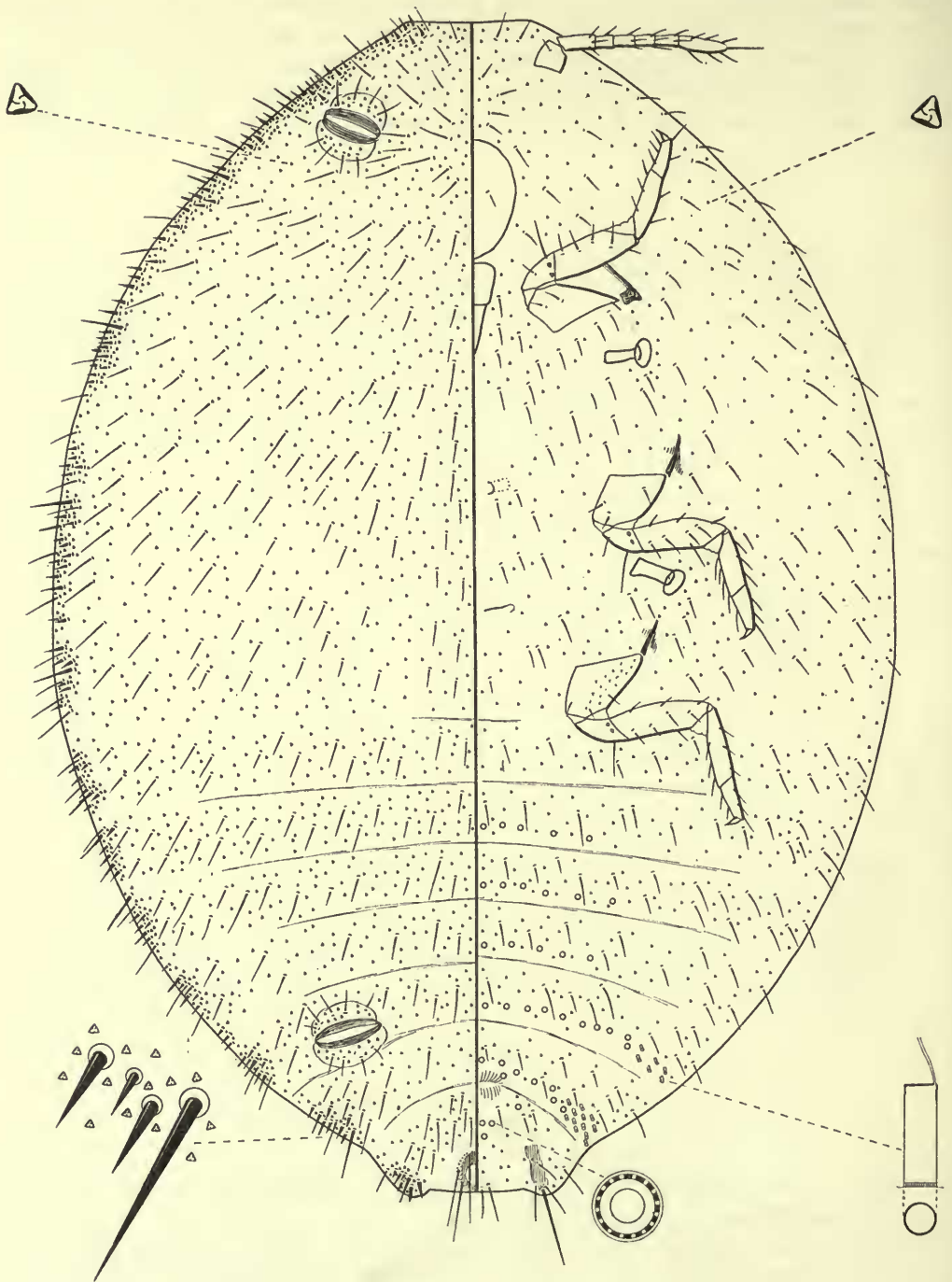


FIG. 10. *Mutabilicoccus artocarpi* sp. n.

absent. Ostioles well developed, the inner edges of the lips sclerotized. Anal ring with 6 setae which are about twice as long as its diameter. Cerarii distinct on the abdomen, each comprising numerous trilocular pores and numerous setae of very different sizes ranging from small and conical to long and stout, the latter often longer than anal ring setae but all having more or less same diameter at base; anterior cerarii in a more or less continuous zone with similar setae to those on abdomen; other setae in the cerarii, presumably auxiliary setae, are long and slender and similar to dorsal setae which often approach length of anal ring setae. Dorsal pores of trilocular type only, somewhat numerous.

Ventral surface of each anal lobe with a long, stout apical seta and a distinct anal bar. Ventral setae all slender but not as long as those on dorsum. Multilocular disc pores in single transverse rows in midregion of posterior edges of segments 4 to 8 and also in a small group posterior to vulva. Tubular ducts in lateral groups of 6-12 on segments 7 and 8. Trilocular pores not numerous, evenly distributed.

Mutabilicoccus simmondsi (Laing) *comb. nov.*

(Text-figs. 11, 12)

Farinococcus simmondsi Laing, 1925, *Bull. ent. Res.*, 16 : 54.

HABIT. Described by Laing from NEW BRITAIN, Kokopo on coconut. Notes given by E. S. Brown show that the external appearance exhibits considerable variation ranging from greyish white with a darkish centre to a form covered with a yellow granular wax. There is some correlation between these extremes and the forms described below, as the former is a characteristic of the typical form and the yellow with the atypical form. Furthermore the specimens of the white form are often abundant in colonies whilst the specimens of the yellow form are more scattered and in a few cases were taken singly. The species has been collected from the Solomon Islands as follows:— GUADALCANAL: Kukum, coconut, tended by *Oecophylla smaragdina* and *Anoplolepis longipes* 20.vii.1954, 27.x.1955; Tenaru, coconut, tended by *Iridomyrmex myrmecodiae* 19.v.1955; Mamara, coconut, tended by *Iridomyrmex myrmecodiae* 29.x.1954, 6.vi.1956; Ilu, *Areca* sp., tended by *Iridomyrmex myrmecodiae* 1.vii.1956; Lunga, coconut, tended by *Pheidole megacephala* 18.vii.1956; SAN CRISTOBAL: Makua, coconut, tended by *Iridomyrmex myrmecodiae* 1.v.1955; NEW GEORGIA: Tusamine, on an unknown shrub, 30.ix.1954; KOLOMBANGARA: Kerikana, coconut, tended by *Oecophylla smaragdina* 2.x.1954; RUSSELL IS.: Pepesala, coconut, 5.ix.1955 and Fai Ami, 9.ix.1955 both tended by *Oecophylla smaragdina*; MALAITA: coconut, B. A. O'Connor 12.v.1950.

Specimens are also at hand from Tomalabatt Plantation, Tatau, NEW IRELAND collected by J. J. H. Szent-Ivany 13.vii.1955.

RECOGNITION CHARACTERS. Shape broadly oval measuring approximately 1.8 × 1.3 mm. Antennae 6-segmented, the third segment about as long as the fourth and fifth together. Legs normal, slender, of moderate length, posterior coxae with a few translucent pores. Circulus present. Ostioles with 2-3 setae and a few trilocular pores on each lip and with inner edges of lips sclerotized. Anal ring situated at

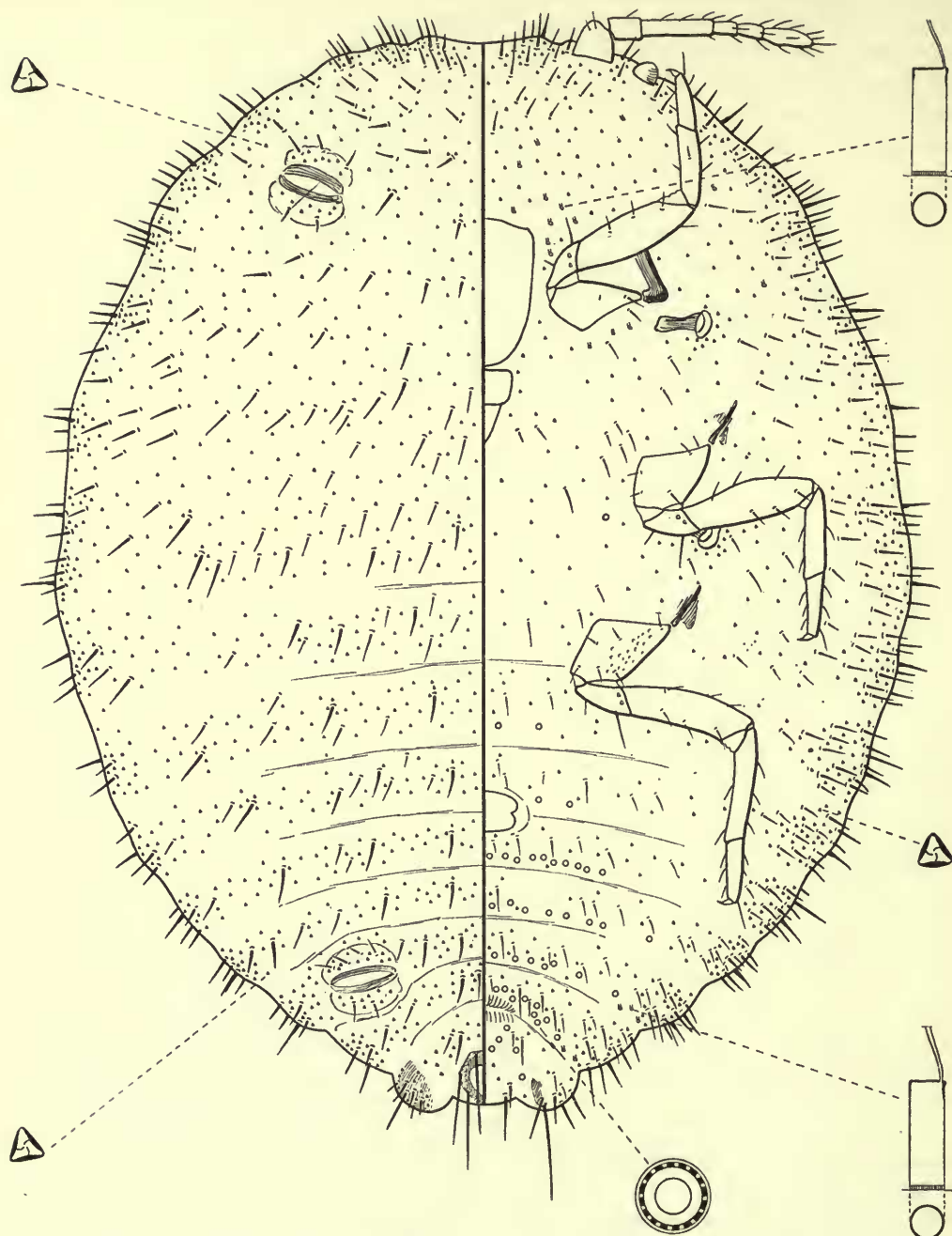


FIG. 11. *Mutabilicoccus simmondsi* (Laing). (Typical form)

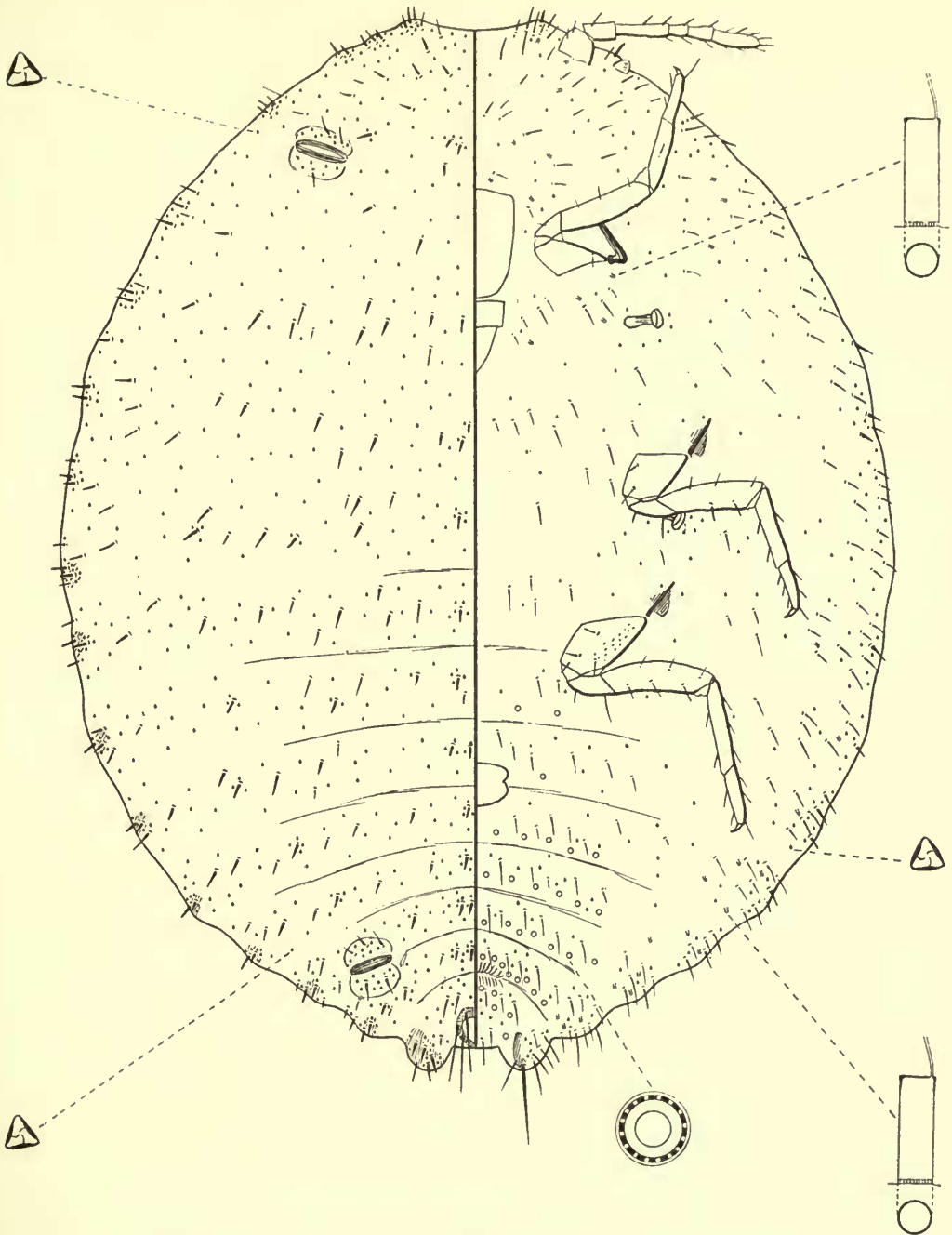


FIG. 12. *Mutabilicoccus simmondsi* (Laing). (Atypical form).

apex of body, with 6 setae which are twice the length of diameter of ring. In the typical form of this species (Text-fig. 11) dorsal setae of various sizes but mainly long and stout becoming more numerous laterally in the positions of the cerarii where with difficulty it is possible to distinguish 18 main groups with a concentration of trilocular pores at the bases. Other dorsal setae often with 2-3 trilocular pores at bases. In the atypical form of this species, (Text-fig. 12), the number and sizes of the dorsal setae are much reduced but again there is no difference in shape between setae occupying the normal positions of the cerarii to the other setae although the 18 pairs of groups are more easily discernible and the abdominal groups are surrounded by lightly sclerotized areas. Other forms of the species show many intermediate conditions, there being a complete range between one extreme and the other. In all cases there is a rather large area of sclerotization about the anal lobes.

Ventral surface with a distinct anal bar and bar seta and a pair of long, stout, apical setae. Ventral setae of various sizes, all slender in midregion but replaced laterally by longer or stouter setae similar to those on dorsal surface. In the typical form the latter setae are quite numerous around the margins but are much reduced in number and size in the atypical form. Multilocular disc pores in all forms rather constant being arranged in more or less single transverse rows on posterior edges of segments 3-8 and becoming more numerous posteriorly, a group also situated posterior to vulva. Tubular ducts of oral collar type in small marginal groups on posterior abdominal segments and also around anterior pair of coxae. Trilocular pores sparse.

NOTES. There is considerable variation in the size and distribution of setae in material at hand and were it not for intermediate forms the two specimens herein illustrated would be placed in different species. Where there is a decrease in the lengths of the setae there seems to be a corresponding decrease in number of setae but the overall pattern of the multilocular disc pores and other characters remains constant.

Neosimmondsia Laing

Neosimmondsia Laing, 1930, *Bull. ent. Res.* 21 : 19.

RECOGNITION CHARACTERS. Subcircular species of Pseudococcidae with 6-segmented antennae; legs normal, claw without a denticle; circulus rectangular; anterior and posterior ostioles present; anal ring lying about its own length from apex of body, cellular with 6 setae; cerarii absent; setae long and slender, as long as or longer than anal ring setae; trilocular pores abundant; multilocular disc pores on ventral surface numerous on abdomen and thorax; tubular ducts on venter only.

NOTES. This genus bears a similarity to *Cryptoripersia* Cockerell and to *Mizococcus* Takahashi. In both these genera, however, there is a single pair of cerarii. The nearest genus is *Pilococcus* Takahashi described in 1928 with *P. miscanthi* as the only included species and differing to *Neosimmondsia* in having 8-segmented antennae instead of 6-segmented and in having multilocular disc pores on the abdomen only. Further study may show that *Neosimmondsia* should be synonymized with *Pilococcus*.

Neosimmondsia hirsuta Laing

(Text-fig 13)

Neosimmondsia hirsuta Laing, *Bull. ent. Res.* 21 : 19, 20.

HABIT. Laing described this species from MALAITA on coconut and it has since been collected only once by E. S. Brown at SAN CRISTOBAL, Santa Catalina on coconut, 23.iv.1955.

RECOGNITION CHARACTERS. A subcircular species with an approximate diameter of 2.3 mm., anal lobes poorly developed. Antennae 6-segmented. Legs normal but coxae rather long in comparison with remainder of limbs, posterior coxae with a few translucent pores. Circulus present, small and rectangular. Ostioles well developed, wide. Anal ring lying about its own length from apex of body, with 6 setae which are slightly longer than ring. Cerarii absent. Dorsal setae numerous, slender and mainly long, often as long as or longer than anal ring setae. Trilocular pores abundant.

Ventral surface with a long, stout pair of apical setae and a small, more or less triangular sclerotized area on the inner side of each anal lobe. Ventral setae all slender, of various sizes but mostly long. Multilocular disc pores numerous across midregions of segments posterior to circulus and also posterior to vulva, anterior to circulus they are numerous in the submedian areas particularly around the coxae. Tubular ducts few, there being small groups in the submargins of segments 7 and 8 and a few lateral to posterior coxae and also posterior spiracles. Trilocular pores numerous.

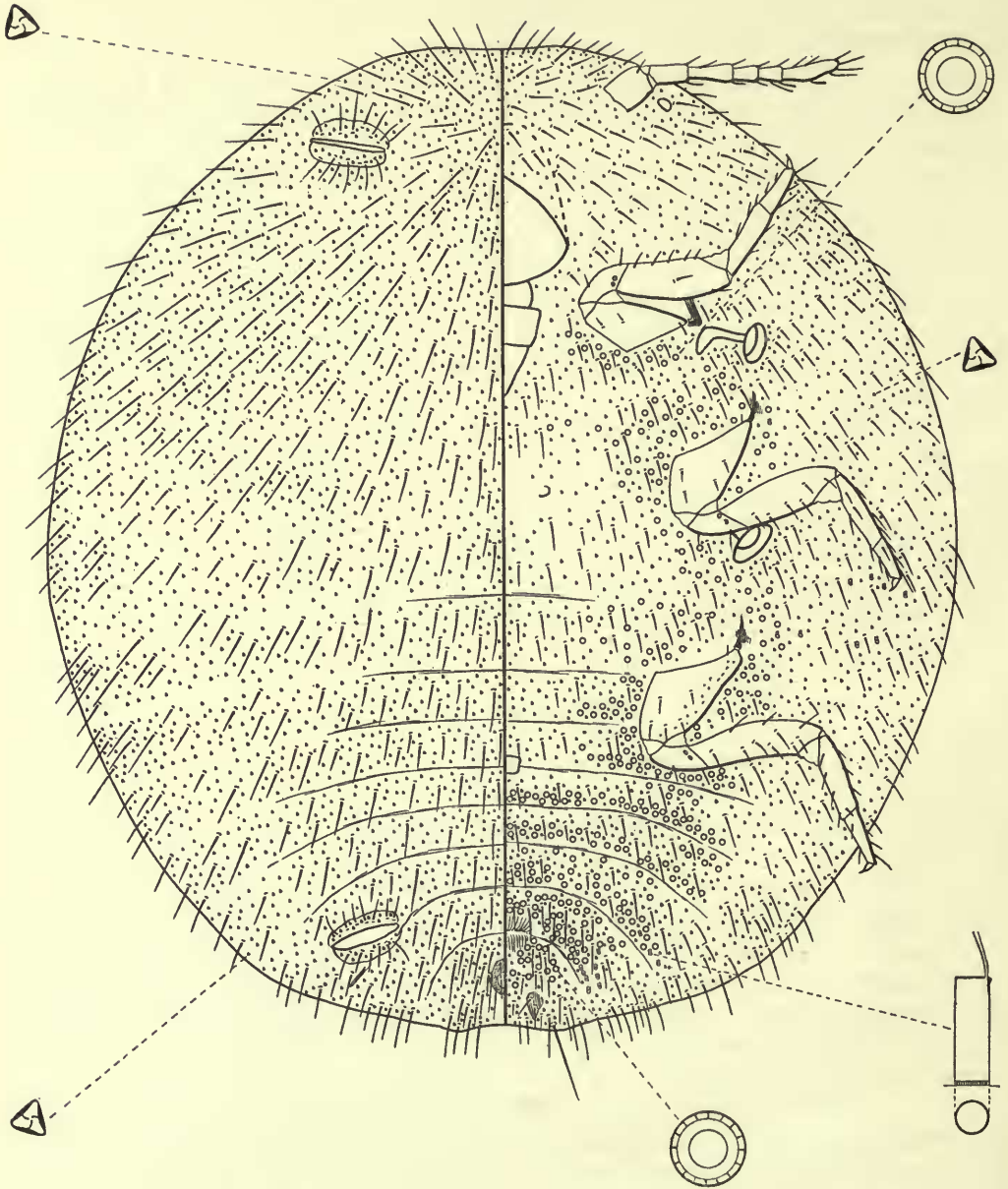
Palmicola gen. n.

Type of genus *Ripersia palmarum* Ehrhorn.

RECOGNITION CHARACTERS. Oval or broadly oval species of Pseudococcidae with posterior end of body rounded, anal lobes poorly developed; antennae 6-7-segmented; cerarii numbering 14-17 pairs each with up to 7 conical setae of various sizes or with but 2 setae of same size, accompanied by 1 or 2 auxiliary setae; legs normal, claw without a denticle, posterior coxae with a few minute ducts which are extended to the surrounding areas of the derm; circulus present, rather small in the known species; anterior and posterior ostioles present; multilocular disc pores present or absent on dorsum, always present on venter from apex of abdomen to head; ventral tubular ducts with oral collar on abdomen only, anal ring at apex of body, cellular with 6 setae.

NOTES. The distinctive features of this genus are the minute ducts surrounding the posterior coxae, a character which is shared with *Pseudantonina* Green but the latter seems to be far removed from *Palmicola* in possessing quite large posterior coxae, at most only 2 pairs of cerarii, and having minute legs and antennae.

The two species *Pseudococcus oceanicus* Takahashi and *Ps. oceanicus* var. *kentiae* Takahashi seem to belong to the genus but these have not been seen by the writer. Two other species still known under the genus *Pseudococcus* as *Ps. cocotis* Mask.

FIG. 13. *Neosimmondsia hirsuta* Laing

and *Ps. saipanensis* Shiraiwa seem to come close to the species of *Palmicola* but are excluded for the time being because they lack the minute ducts around the posterior coxae.

The genus seems to be confined to the plant family Palmaceae and will probably be found throughout the Pacific. Specimens of *P. palmarum* (Ehrh.) are at hand from Sepang in Malaya and it is possible that this or related species may be found in Indonesia and the Philippine Islands.

The new species may be separated from the type by the following key :—

Antennae normally 6-segmented, cerarii numbering 14–15 pairs, each cerarius with up to 6 or more setae	<i>palmarum</i> (Ehrhorn)
Antennae 6–8-segmented, cerarii numbering 17 pairs each with 2 setae or sometimes with 3 in the head region	<i>browni</i> sp. n.

***Palmicola browni* sp. n.**

(Text-fig. 14)

HABIT. A white powdery mealybug taken from various parts of coconut trees but especially on the terminal bud, the bases of young leaves and unopened spadix sheaths. It has been collected from the following localities :— GUADALCANAL : Kukum, 12.viii.1948, B. A. O'Connor, same locality tended by *Anoplolepis longipes*, E. S. Brown, 20.vii.1954, (holotype) ; Lunga, 18.vii.1956 tended by *Pheidole megacephala* ; BOUGAINVILLE : Numa-Numa, 1.vi.1956 ; RENNELL : Lavanggu, 23.xi.1955 ; RUSSELL Is. : Butete, 5.ix.1955 ; SAN CRISTOBAL : Boroni and Waimarai, 14.x.1955, associated with *Pheidole megacephala*.

Specimens are also at hand collected by J. L. Froggatt in 1937 from NEW BRITAIN (without locality) and ADMIRALTY IS., Manus.

RECOGNITION CHARACTERS. Length approximately 2.6 mm. Shape broadly elliptical, anal lobes moderately developed, posterior margin rounded. Antennae 6–8-segmented, the fusion of the segments in the 6-segmented condition taking place in the third and terminal segments. Legs normal, slender, posterior coxae with a few minute tubular pores, these pores also extending to the surrounding membranous areas anterior and posterior to junction of coxae and ventral derm. Circulus present, shape varying from subcircular to quadrate and lying between fourth and fifth segments. Ostioles with narrow lips and a few trilocular pores, rarely with setae but inner edges of lips sclerotized. Anal ring with 6 setae, these about twice as long as its diameter. Cerarii numbering 17 pairs each consisting of a pair of short stout conical setae usually of same size but often of different sizes, anterior cerarius often with three conical setae, all cerarii with small clusters of trilocular pores. Dorsal setae of moderate length, all slender. Multilocular disc pores sparse, being confined to anterior abdominal segments, thorax and head lying at anterior and posterior edges of segments. Trilocular pores not numerous.

Ventral surface with a pair of long apical setae. Other ventral setae slender and similar to those on dorsum. Multilocular disc pores present in all regions, in no definite arrangement on head and thorax but on abdomen they lie in transverse rows at anterior and posterior edges of segments. Tubular ducts small and sparse, on

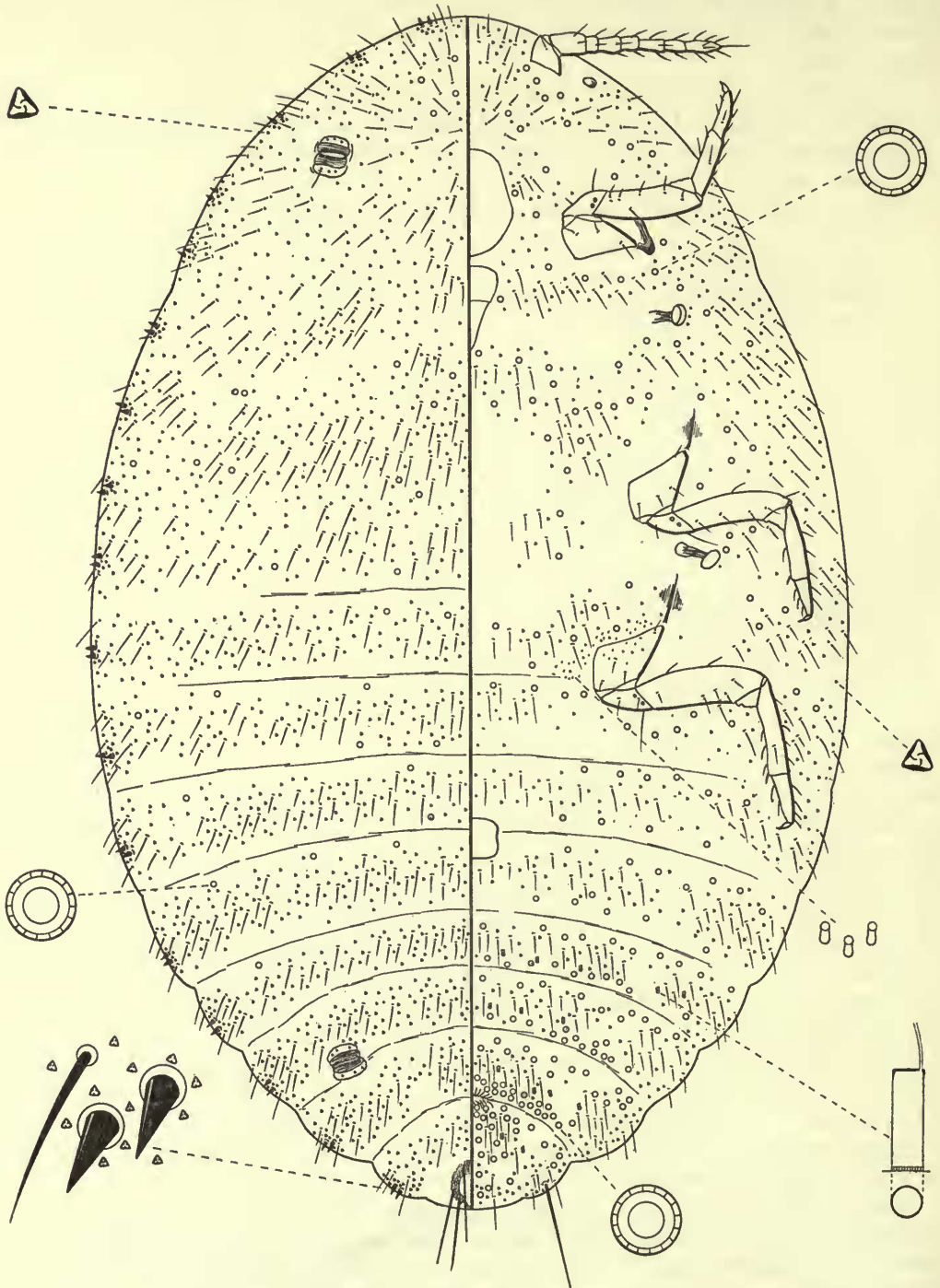


FIG. 14. *Palmicola browni* sp. n.

the sixth and posterior segments only, lying in single transverse rows. Trilocular pores evenly distributed.

Paraputo Laing

Paraputo Laing, 1929, *Ann. Mag. nat. Hist.* (10) 4: 473.

Type of genus *Paraputo ritchei* Laing = *Ripersia anomala* Newstead.

RECOGNITION CHARACTERS. Pseudococcidae with broadly oval body, anal lobes either protruding or poorly developed, antennae 6-segmented; legs usually rather short and stout, claw without a denticle; anterior and posterior ostioles well developed; circulus usually well developed; anal ring lying on dorsal surface at a distance of one to two times its diameter from apex of body, cellular with 6 setae; cerarii numbering up to 18 distinct pairs or reduced in number to the posterior abdominal segments or joined on entire margin forming a more or less continuous row, when distinct each cerarius composed of numerous conical setae; dorsal setae usually short although in one species they are nearly as long as anal ring setae, always rather abundant; trilocular pores quite numerous on dorsum and venter; multilocular disc pores on venter only; tubular ducts confined to ventral abdominal areas either sparse or numerous but always in large or small groups on submargins of posterior segments. With or without a small area of sclerotization on ventral anal lobes.

NOTES. This genus has been redefined after a recent study of the type species (Williams 1958). The two following species are referred to the genus in possessing 6-segmented antennae although one of them is known with 7-segmented antennae. Ferris (1955) redescribed the genus from immature specimens and if he had had available some adult females it is doubtful whether he would have erected the genus *Cataenococcus* as this differs only in possessing 8-segmented antennae. As other species are known with 7 segments it seems reasonable to assume that *Cataenococcus* will be reduced to a synonym of *Paraputo*.

The two Solomon Islands species and the type from Africa may be separated by the following key:—

1. Cerarii reduced in number to 11–13 pairs, being missing on the thorax, anal lobes protruding, with distinct ventral clusters of tubular ducts on the submargins of segments 7 and 8 *anomala* (Newstead)
- Cerarii complete around the margins as 18 distinct pairs or forming a more or less continuous row 2
2. Cerarii numbering 18 distinct pairs, dorsal setae about same length as cerarian setae without an area of sclerotization on anal lobes *leverii* (Green)
- Cerarii numbering 18 pairs but these often connected by conical setae, dorsal setae and auxiliary setae nearly as long as anal ring setae, ventral surface of anal lobes with a distinct area of sclerotization *kukumi* sp. n.

Paraputo kukumi sp. n.

(Text-fig. 15)

HABIT. Taken from the aerial roots of coconut, GUADALCANAL, Kukum, 14.viii. 1948, B. A. O'Connor. External appearance not known.

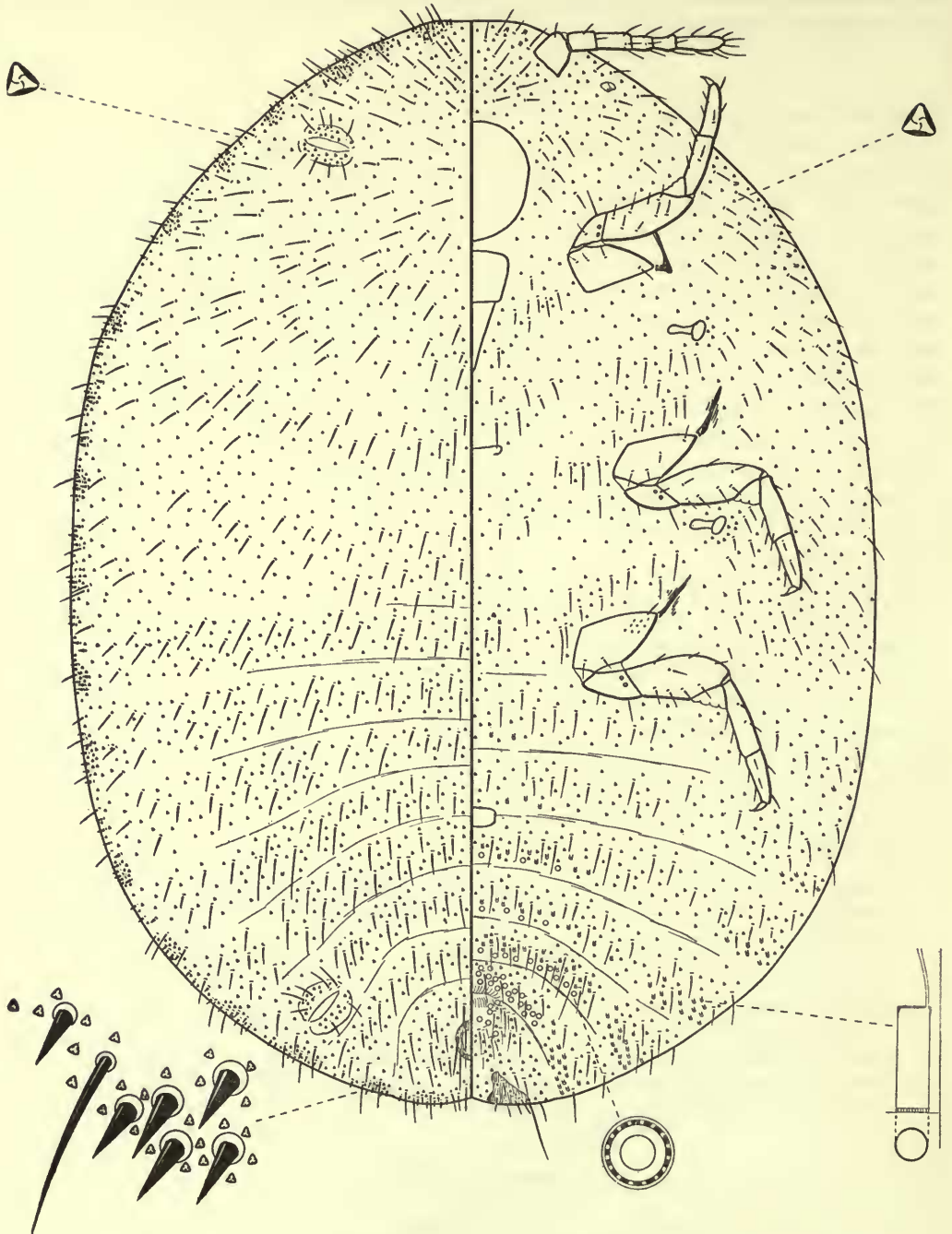


FIG. 15. *Paraputo kukumi* sp. n.

RECOGNITION CHARACTERS. A broadly oval species attaining a length of 2.0 mm., older specimens becoming more rotund, anal lobes poorly developed. Antennae 6-segmented. Legs short and stout, posterior coxae with a few translucent dots. Circulus present, in specimens available it is distorted but apparently it is rather small. Ostioles moderately developed, lips with a few setae and trilocular pores. Anal ring situated about its own length from apex of body, with 6 setae, these slightly longer than diameter of ring. Cerarii present in a more or less continuous row around margin although it is possible to define 18 groups of setae which are connected by other cerarian setae. Cerarian setae small and conical, numerous and with long auxiliary setae which do not appear to be constant in number or position. In the three specimens available many of the cerarian setae are missing so that the accompanying diagram must be regarded as tentative although the cerarian setae have been drawn from the pattern of the setal bases. Dorsal setae mainly long and slender, many approaching size of anal ring setae. Trilocular pores somewhat numerous.

Ventral surface with a noticeable triangular sclerotized area on each anal lobe containing a few setae and trilocular pores. Setae slender, varying in size but mainly similar to those on dorsum. Multilocular disc pores on all segments posterior to circulus, fifth and sixth segments with 4-7, seventh segment with 13-16, eighth with about 30 pores, there being also a group of about 9-12 posterior to vulva. Tubular ducts of oral collar type confined to abdomen in midregion in transverse rows and in lateral groups on third to seventh segments and also in lateral groups on eighth segment, becoming more numerous posteriorly. Trilocular pores numerous and evenly distributed.

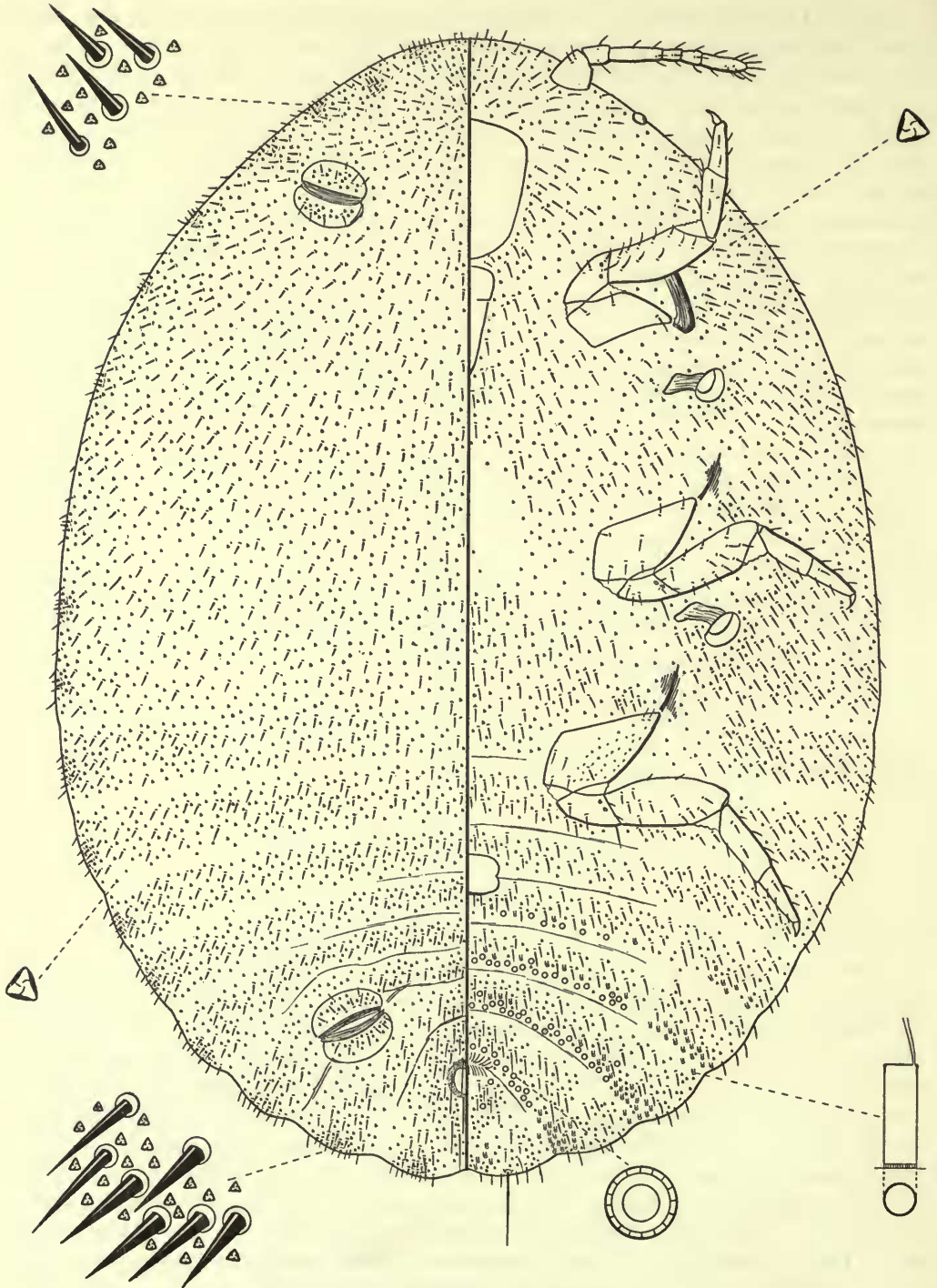
NOTES. This species has been described from three specimens which are not in perfect condition. The more or less continuous row of cerarian setae and the long dorsal setae serve to distinguish the species.

Paraputo leveri (Green) (*comb. nov.*)

(Text-fig 16)

Pseudococcus leveri Green, 1934, *Ann. Mag. nat. Hist.* (X) 13 : 473, 474.

HABIT. A mealybug covered with white wax and usually associated with ants, described originally without locality from the Solomon Islands on coconut. It also feeds on other hosts and specimens are at hand from Fiji on *Bischoffia javanica* collected by B. A. O'Connor 23.xi.1957. GUADALCANAL : Kukum, coconut, 14.viii.1948, B. A. O'Connor, aerial roots of coconut with *Iridomyrmex myrmecodiae*, 4.x.1956, E. S. Brown ; Tenaru, coconut roots tended by *Pheidole umbonata* 31.vii.1954, with *Iridomyrmex myrmecodiae*, 5.viii.1954, *Ficus septica* tended by *Iridomyrmex myrmecodiae* 24.iv.1956 ; Rua Vatu, coconut roots associated with *Ireneidris myops*, 25.x.1956, *Ficus* sp. roots tended by *Technomyrmex detorquens*, 19.xi.1954. MALAITA : Baunani, coconut roots tended by *Ireneidris myops*, 10.xi.1954. RENDOVA : *Ficus* sp. tended by *Technomyrmex detorquens* 8.x.1954. SAN CRISTOBAL : Ugi, Three Sisters, Boroni and Waimamura, all on coconut tended

FIG. 16. *Paraputo leverii* (Green).

by *Pheidole megacephala*; Waimamura, *Inocarpus edulis* tended by *Oecophylla smaragdina*, all April 1955; Kira Kira, *Ficus* sp. with *Iridomyrmex myrmecodiae* 20.viii.1956. RUSSELL IS.: Fai Ami, coconut roots, 9.xi.1955. NGELLA: Votilau, coconut roots, 10.xi.1956.

RECOGNITION CHARACTERS. Young adult females elongate oval, sides subparallel, older adults more rounded, attaining a length of 3.8 mm. Antennae 6-7-segmented. Legs short and stout, posterior coxae with translucent pores. Circulus rather large. Ostioles well developed with numerous setae and trilocular pores, inner edges of lips sclerotized. Anal ring situated about twice its length from apex of body, with 6 setae, slightly longer than diameter of ring. Cerarii numbering 18 pairs, small on thorax, each comprising 3-4 conical setae but large on head and abdomen, anal lobe and penultimate cerarii each with up to 12 conical setae and numerous trilocular pores. Dorsal surface with numerous short setae, these slightly longer but more slender than cerarian setae. Trilocular pores abundant.

Ventral surface with numerous slender setae tending to be longer than those on dorsum. Multilocular disc pores on all segments posterior to the circulus, in more or less single transverse rows at posterior edges of segments and in a small cluster of 4-5 posterior to vulva. Small tubular ducts in groups of up to 15 between anal lobes and near posterior lateral margins as far as fifth segment, fifth to seventh segments also with single transverse rows in midregion. Trilocular pores numerous.

Pedrococcus Mamet

Pedrococcus Mamet, 1942, *Proc. R. ent. Soc. Lond. B*, 11: 79.

Mamet erected this genus for four species from Mauritius with *Pedronia greeni* Mamet as type. Since then another two have been added all from the Malagasian area. According to Mamet it differs from *Pedronia* in having the dorsal conical setae on small sclerotized areas and with one or two trilocular pores at the bases.

The genus *Pedronia* Green has been redescribed by Mamet (1942) from specimens of *P. strobilanthis* Green the type species. It has been shown that none of the setae or cerarii is situated on sclerotized areas but in specimens at hand some of the dorsal setae have one or two trilocular pores at the bases. Another species *P. strobilanthis tenuispina* Green seems to be referable to *Pedrococcus* because from the single specimen at hand the lateral and dorsal setae are situated on sclerotized areas. A revision of the whole group is needed to clarify the position.

Pedrococcus tinahulanus sp. n.

(Text-fig. 17)

HABIT. Collected from a small tree in the carton shelters made by *Iridomyrmex myrmecodiae* on the underside of the leaves. GUADALCANAL: Tinahula River, 22.iii.1955.

RECOGNITION CHARACTERS. Shape of adult female broadly oval measuring approximately 1.8 mm. long. Antennae 7-segmented. Legs normal, the posterior

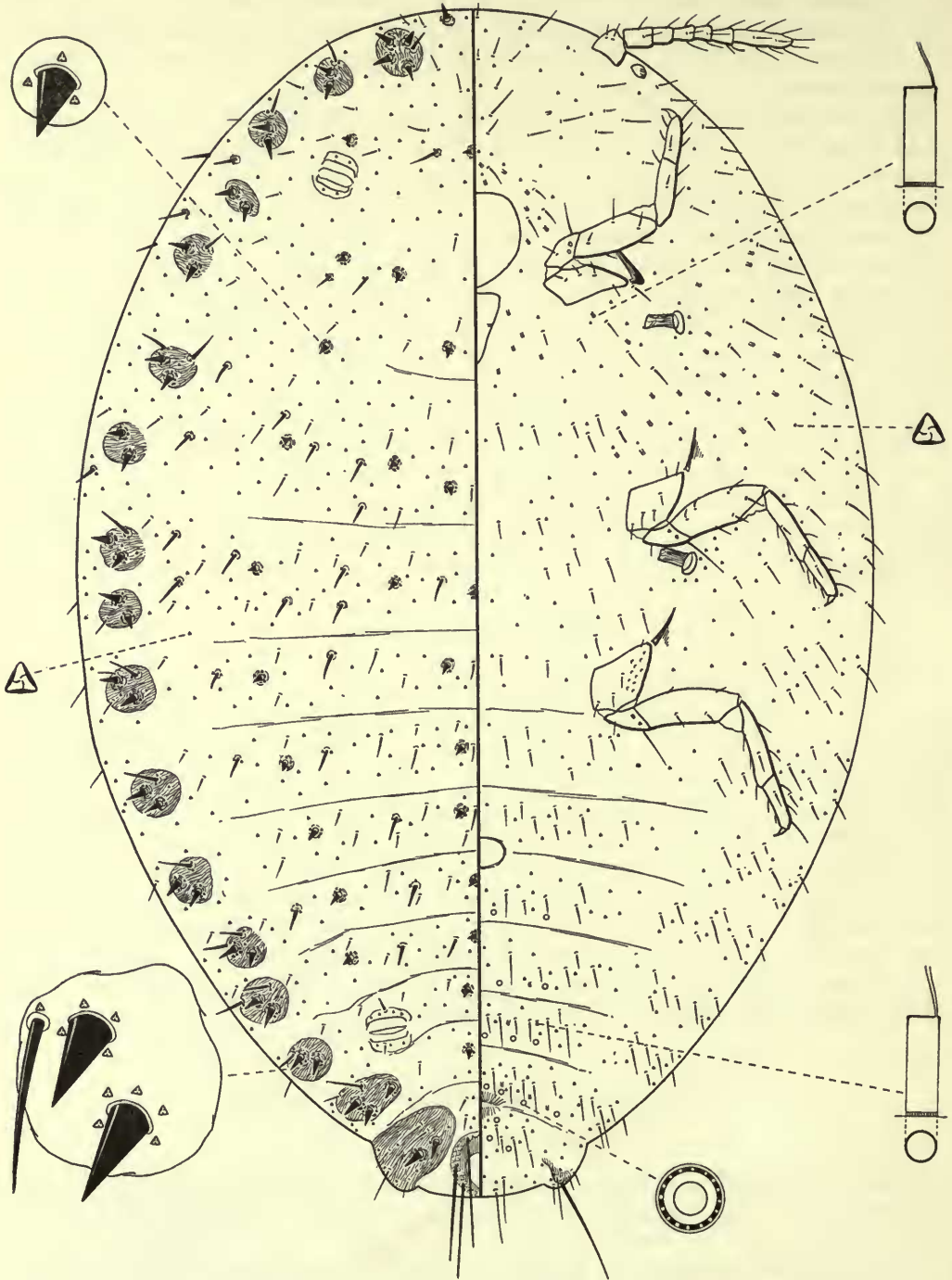


FIG. 17. *Pedrococcus tinahulanus* sp. n.

coxae with a few translucent pores. Circulus present, round and rather small. Ostioles with narrow membranous lips containing two or three trilocular pores and an occasional seta, inner edges of lips sclerotized. Anal ring with 6 setae these about twice as long as diameter of ring. Cerarii numbering 17 pairs each borne on a sclerotized plate. Anal lobe cerarius with 2 stout conical setae, with a few trilocular pores and accompanied by a few slender setae on a sclerotized plate which is about twice the size of anal ring. Anterior cerarii each with a pair of stout conical setae except the anteriormost which has up to four, the cerarian setae about 2-3 times as long as diameter at base and accompanied usually by one or two long, stout setae. Trilocular pores in the cerarii arranged mainly around bases of setae. Dorsal setae of various sizes, there being a few small conical setae arranged in transverse rows each about $1\frac{1}{2}$ -2 times as long as basal diameter and with about three trilocular pores at base surrounded by a lightly sclerotized circular area. Longer setae but of smaller diameter interspersed with the small conical setae and each with one or two trilocular pores at base, other setae present small and slender. Trilocular pores sparse.

Ventral surface with a long, stout pair of apical setae each attached to a small sclerotized anal bar. Ventral setae of different sizes but all slender. Multilocular disc pores in single transverse rows in midregion of segments posterior to circulus, not numerous, at most there being about 40 altogether. Tubular ducts present in small numbers of 2-4 in midregion of segments 6-8 and also more numerous in groups between first pair of coxae and between first and second pairs of coxae. Trilocular pores sparse.

NOTES. This species comes closest to *Pedrococcus longisetosus* Mamet described from Mauritius but differs in having the dorsal conical setae shorter in relation to the marginal conical setae. The slender dorsal setae in *P. tinahulanus* are also shorter than those of *P. longisetosus*.

Planococcus Ferris

Planococcus Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 164.

Only one species has so far been collected in the Solomon Islands and this is a cosmopolitan species. Species are at hand from New Guinea from genera related to *Planococcus* and it is possible that these or similar species may yet be found in the Solomon Islands.

Planococcus citri (Risso)

Dorthisia citri Risso, 1813, *Ann. Mus. Hist. nat. Paris*, 30 : 416-418.

Planococcus citri (Risso), Ferris, 1950, *Atlas of Scale Insects of North America*, 5 : 165.

Planococcus citri (Risso), Ezzatt & McConnell, *Univ. Maryland Agric. Exp. Sta. Bull.* A-84 : 65.

GUADALCANAL : Honiara, Tomato, B. A. O'Connor, 9.viii.1948 ; Kukum, *Tephrosia* sp., E. S. Brown, 28.vii.1954, custard apple tended by *Technomyrmex detorquens*, 19.i.1955 ; Tenaru, *Senecio* sp. with *Iridomyrmex myrmecodiae*, 5.viii.1954, *Mimosa pudica*, 29.vi.1954 and *Macaranga* sp. tended by *Anoplolepis longipes*,

18.xi.1954. RUSSELL Is.: Banoka, Tomatoes, B. A. O'Connor, July 1933; Fai Ami, *Sonneratia* sp., E. S. Brown, 9.xi.1955; Yandina, *Theobroma cacao*, 12.v.1955. MALAITA: Auki, *Theobroma cacao* with *Technomyrmex detorquens*, 4.ix.1954; Rongofano, 28.v.1955. SAN CRISTOBAL: Kira Kira, *Theobroma cacao*, 20.vii.1956; Three Sisters, Malaupaino, *Cocos nucifera*, B. A. O'Connor, 13.v.1934. SANTA YSABEL: Holokama, *Theobroma cacao* tended by *Technomyrmex detorquens* and *Oecophylla smaragdina* 17.ii.1956; Huhurangi, *Theobroma cacao* tended by *Anoplolepis longipes*, 18.ii.1956. BOUGAINVILLE: Buka, *Theobroma cacao* with *Technomyrmex detorquens*, 29.v.1956; Kieta, *Coffea* sp. J. L. Froggatt, 19.ix.1937, 17.viii.1938. NEW GEORGIA: Arundel, *Morinda citrifolia* tended by *Anoplolepis longipes*, 4.x.1954. RENNELL: Nanggan, a legume tended by *Iridomyrmex myrmecodiae*, 24.xi.1955. NGELLA: Tulazi, *Annona muricata*, R. A. Lever, 28.vii.1934.

Pseudococcus Westwood

Pseudococcus Westwood, 1840, *Intr. Mod. Class. Ins. Syn. Br. Ins.* 2: 118.

Pseudococcus Westwood, Ferris, 1950, *Atlas of Scale Insects of North America*, 5: 170.

Ferris erected the genus *Dysmicoccus* to cater for those species which were similar to *Pseudococcus* but without oral rim ducts. Some of the *Pseudococcus* species known throughout the Pacific area have a reduced number of oral rim ducts and at times reduced to a single duct only. Whether the presence or absence of oral rim ducts is sufficient for generic separation can only be found after further species have been studied. The two species from the Solomon Islands can be identified from the following key:—

With, at most, a single oral rim duct behind each of the first and tenth cerarii

solomonensis sp. n.

With usually 3 oral rim ducts of different sizes near most cerarii . *adonidum* (Linnaeus)

Pseudococcus adonidum (Linnaeus)

Coccus adonidum Linnaeus, 1766, *Syst. Nat.*, Ed. 12, 1: 740.

Pseudococcus adonidum (Linnaeus), Ferris, *Atlas of Scale Insects of North America*, 5: 174.

Taken on one occasion only at GUADALCANAL, Kukum, Kokumbona River, on *Ficus septica* tended by *Iridomyrmex myrmecodiae*.

Pseudococcus solomonensis sp. n.

(Text-fig. 18)

HABIT. Taken from the fruits of *Theobroma cacao* where the ants, *Technomyrmex detorquens*, had built carton shelters over them, the colonies situated mainly down the length of the fruit in the grooves, SANTA YSABEL, Holokama, 21.ii.1956. Tended also by the same ant in the axis of a bunch of fruit of wild banana, MALAITA, Rongofano, 28.v.1955.

RECOGNITION CHARACTERS. Body broadly oval attaining a length of 3.5 mm. Antennae 8-segmented. Legs normal, posterior pair with numerous translucent

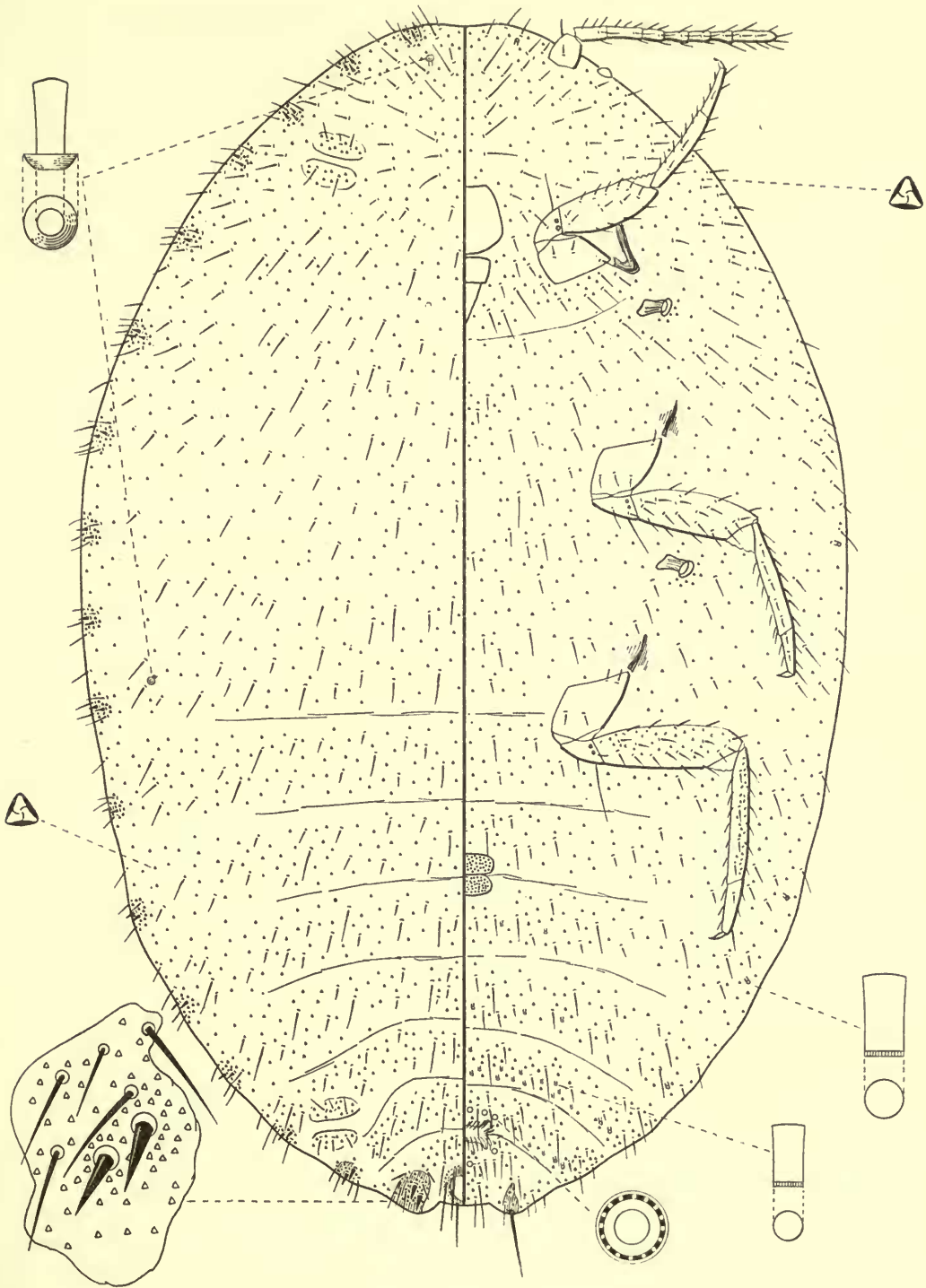


FIG. 18. *Pseudococcus solomonensis* sp. n.

pores on each femur and tibia. Circulus well developed. Ostioles with 2-3 small setae and a few trilocular pores on each lip. Anal ring with 6 setae which are nearly twice as long as diameter of ring. Vulva of an indefinite shape with internal folds. Cerarii numbering 17 pairs; anal lobe cerarii each with a pair of stout conical setae accompanied by a cluster of trilocular pores and about 6 slender setae, surrounded by a sclerotized area about same size as anal ring. Anterior cerarii each composed of 2 conical setae except some of anterior cerarii which have 3, each surrounded by a group of trilocular pores and 3-5 auxiliary setae. Dorsal setae not numerous, of various sizes but all slender. Tubular ducts of oral rim type, at most represented by 2 pairs, an anterior pair behind the first cerarii and another pair next to the tenth cerarii, one pair of these often missing or missing on one side of the body only, occasionally absent entirely. Trilocular pores evenly distributed.

Ventral surface of body with a wide curved sclerotized area on anal lobes. Apical setae long and stout. Ventral setae slender and not numerous. Multilocular disc pores situated about the vulva only, there being scarcely more than about 15 altogether. Tubular ducts of oral collar type of two sizes, a small type situated in midregion of segments posterior to circulus, these sparse in transverse rows except on seventh segment where they are more numerous. A larger type situated around margins, there being usually a pair on the seventh and eighth segments and singly on some of the other segments. Trilocular pores sparse.

NOTES. The species belongs to a group known from the Pacific area with a reduction in number of oral rim ducts and multilocular disc pores and also possessing a vulva with a sclerotized folding similar to that of *Pseudococcus floriger* Ferris.

Trionymus Berg

Trionymus Berg, 1899, *Comun. Mus. nac. B. Aires*, 1: 78.

Trionymus Berg, Ferris, 1950, 1953, *Atlas of Scale Insects of North America*, 5: 251, 6: 482.

This genus usually occurs on grasses and some other monocotyledons but there are a few exceptions including the following species which has been collected from *Ficus copiosa*. In the Solomon Islands *Ficus* often seems to be an alternative host to those species which normally feed on coconut. According to E. S. Brown these are not chance records due to proximity because many of the collections from *Ficus* were made at great distances from the nearest coconut trees. It seems possible that the following species may yet be found on coconut, a more natural host.

Trionymus chalepus sp. n.

(Text-fig. 19)

HABIT. Collected on *Ficus copiosa* and tended by *Iridomyrmex myrmecodiae* which stroke them with the antennae, GUADALCANAL, Tenaru, 5.viii.1954.

RECOGNITION CHARACTERS. A small oval species measuring approximately 3.2 × 2.0 mm. Antennae 8-segmented. Legs short and slender, the posterior coxae with a few translucent pores. Circulus small and round. Ostioles present with

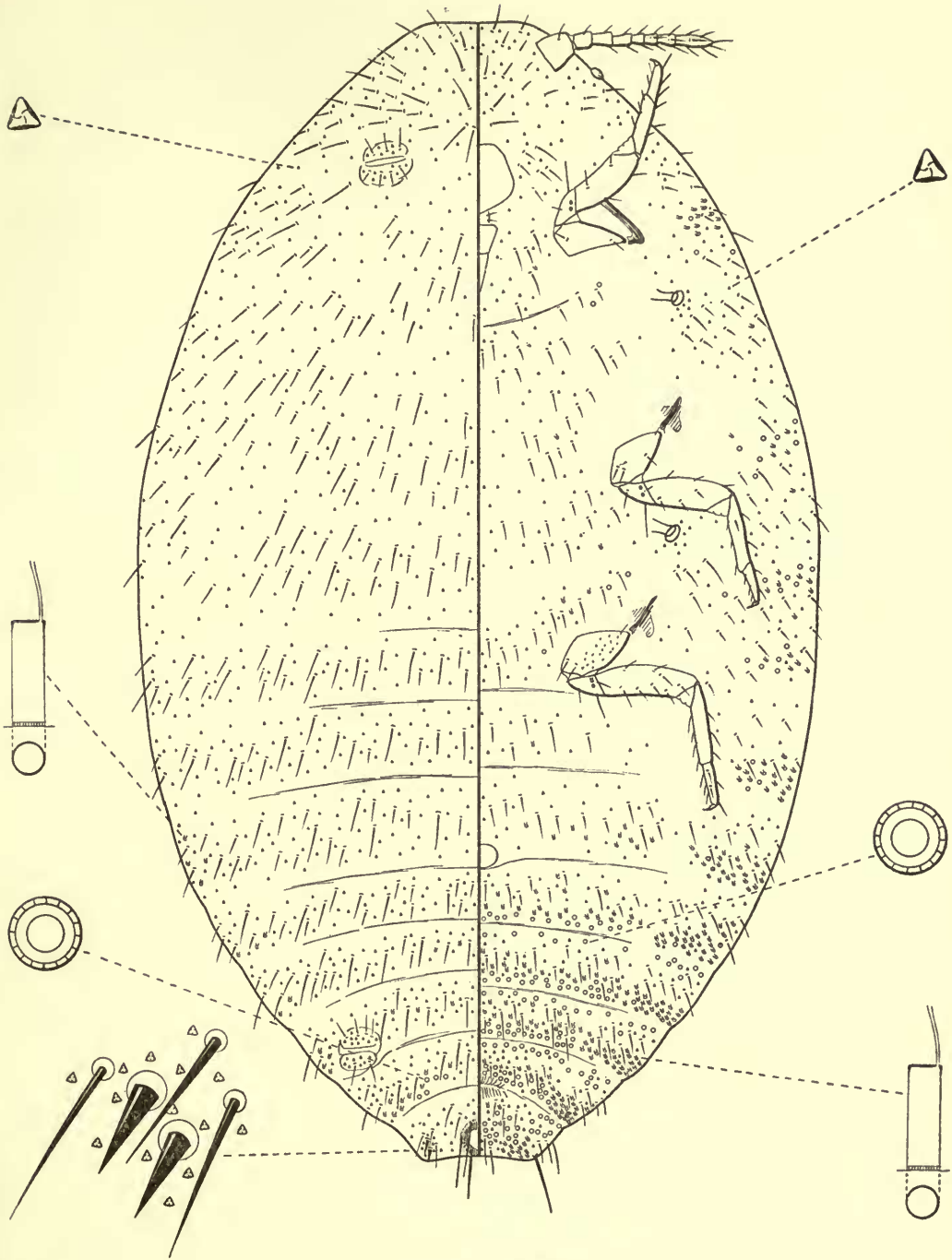


FIG. 19. *Trionymus chalepus* sp. n.

3-4 setae and a few trilocular pores on each lip. Anal ring with 6 setae nearly twice as long as its diameter. Cerarii represented by a pair on anal lobes only, each with 2 short, conical setae, a few trilocular pores and 3 auxiliary setae. Dorsal setae rather long and slender. Multilocular disc pores numbering about 10 in a single row at posterior edge of eighth segment only. Tubular ducts small, arranged in small groups of 2-4 on margins of fourth to eighth segments and a few in midregions of segments 6-8. Trilocular pores few, evenly distributed.

Ventral surface with apical setae only slightly larger than anal ring setae. Setae not numerous, all slender and tending to be shorter than those on dorsal surface. Multilocular disc pores abundant on abdomen posterior to circulus, arranged more or less in double transverse rows at posterior edges of segments 6-8; groups of up to 7 situated on margins as far as prothorax, other occasional pores present near coxae. Small tubular ducts, numerous, in transverse rows on fourth and posterior segments and also in marginal groups anterior to prothorax, a few also present in mid-thoracic region. Trilocular pores evenly but sparsely distributed.

NOTES. This species has been described from three specimens only. In the distribution of the multilocular disc pores and ventral tubular ducts, it comes close to *Trionymus festucae* (Kuwana) but differs in possessing a larger circulus and fewer tubular ducts on the dorsum. The tubular ducts in *T. festucae* are very short whereas in *T. chalepus* they are of more normal length.

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